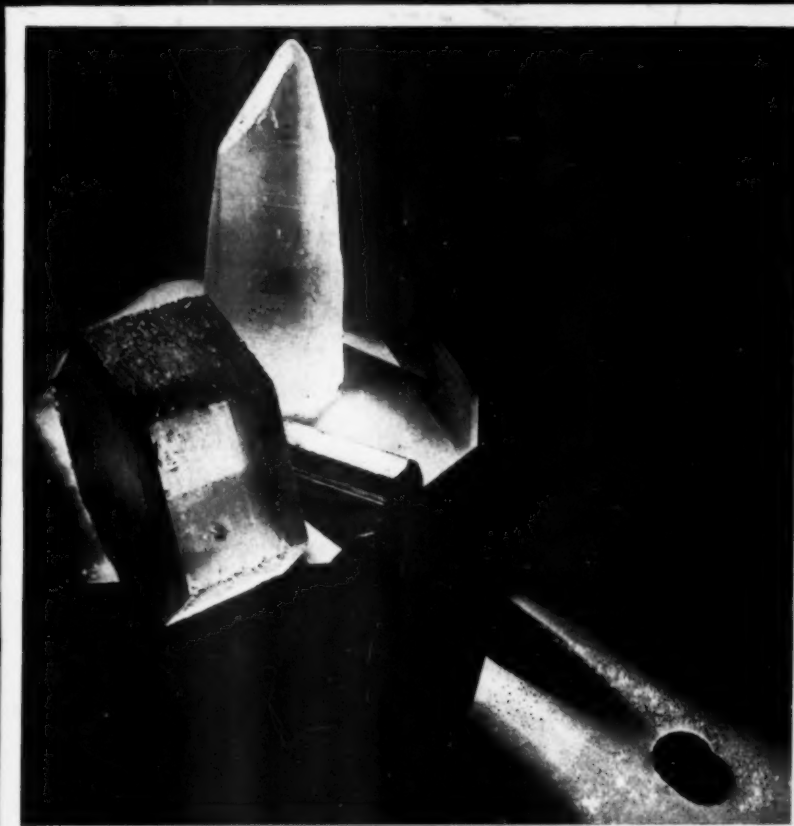


QST 

amateur radio





THE HANDIEST LOG YOU EVER USED
THE OFFICIAL A.R.R.L.
LOG BOOK!

It's actually easier to maintain a neat and well-kept log than a hay-wire one — if you use the official A.R.R.L. Log Book. And think of the favorable impression this handsome log will make on your friends — or upon the R. I., either, should he ever call upon you for your station's record of performance!

Everything you have ever wanted in a real log; thirty-nine pages 8 $\frac{1}{4}$ " x 10 $\frac{3}{4}$ " ruled up with headings as shown; thirty-nine blank pages for notes; complete log-keeping instructions by the League's Communications Manager; handy tabulations on the inside covers of the most-used Q signals, amateur prefixes, and operating hints. All bound in durable brown covers of heavy stock with space for your station call and dates over which the log entries extend.

SEND IN YOUR
ORDER TODAY!
FORTY CENTS EACH
THREE FOR ONE DOLLAR
POSTPAID ANYWHERE

AMERICAN RADIO RELAY LEAGUE

WEST HARTFORD, CONN., U. S. A.

de Forest

Automobile Radio AUDIONS

For Battery, D. C. or A. C. Operation

Primarily to meet the rigid requirements of automobile radio yet answering the demands of the universal receiver, DeForest now offers four new Audions — Types 436 (R.F. Amplifier and Detector), 437 (Detector and General Purpose Amplifier), 438 (Output Pentode) and 439 (R.F. Pentode). These 6.3 volt heater tubes insure steady, quiet, reliable and economical service on battery, D.C. or A.C. operation.

Featuring the DeForest Cathode

Instead of the usual coiled and unsupported filament with its mechanical and electrical uncertainties especially under vibration, these new DeForest Audions incorporate a four-hole insulator threaded "M" fashion. The cathode sleeve surrounds the non-inductive heater. Hum and noise are reduced to the lowest level. Rigidly held in place, the filament cannot sag or short-circuit. It is positively free from current fluctuations even under intense vibration. No hot spots. No current leakage. The filament is free from premature breakage or burnout. The insulator withstands the highest operating temperature with an ample factor of safety. Longest service life is assured.

For Automobile Radio or Universal Receiver

These new Audions, fulfilling every function in the modern receiver, provide exceptional results in the automobile radio set, the broadcast or short-wave battery receiver, or again the universal or portable receiver operating on battery or socket power, D.C. or A.C. They are, in brief, today's practical, universal tubes.

Write for data on these and other types of DeForest Audions for every receiving, transmitting, laboratory, scientific or industrial purpose, made by the pioneer tube maker. And remember that DeForest also builds complete transmitters, amplifiers, television and other equipment.

DeForest Radio Company

PASSAIC

» «

NEW JERSEY

"OVER SEVEN
YEARS OLD,—
BEEN DROPPED,
OVERLOADED,
—BUT STILL
GOING
STRONG!"



While we deplore the indignations to which our seven-year-old child has been subjected, we can't resist printing Mr. Rigor's letter.

We have always boasted that CARDWELLS stand the gaff. That's because we know what goes into our condensers—what engineering skill as well as the finest materials available. Remember that there is a CARDWELL for every tube and purpose.

It will pay you to know about CARDWELLS—ask W 3 Q L.

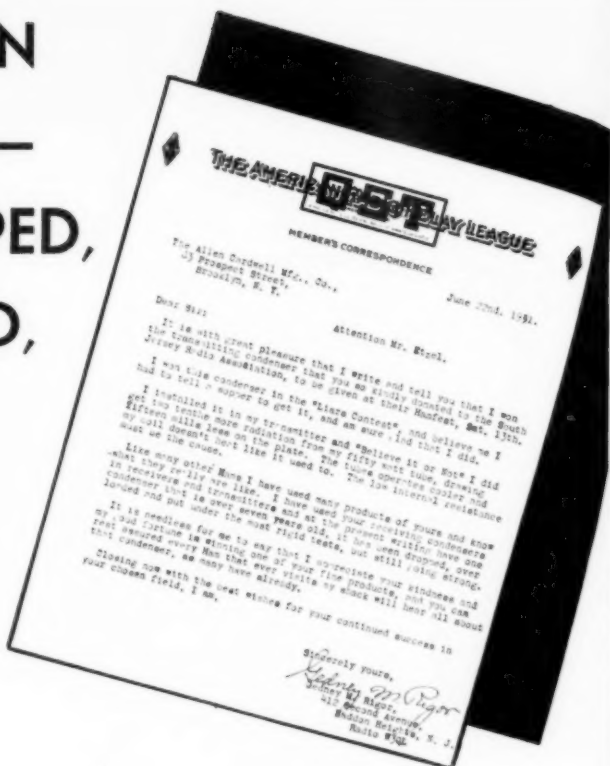
Send for literature

CARDWELL CONDENSERS

The ALLEN D. CARDWELL MFG. CORP.
83 Prospect Street, Brooklyn, N. Y.

The supplier who tries to discourage you, or attempts to substitute, or refuses to supply CARDWELLS has not your interest at heart. He can get CARDWELLS for you if service means as much to him as a little more profit. Get what you want—insist on CARDWELLS. Order direct from us if your dealer will not supply, or let us tell you where you may buy.

"THE STANDARD OF COMPARISON"



QST

Published monthly, as its
official organ, by the Amer-
ican Radio Relay League,
Inc., at West Hartford,
Conn., U. S. A.; Official
Organ of the Internation-
al Amateur Radio Union

devoted entirely to AMATEUR RADIO

Contents

Editorials	9
Fundamental Crystal Control for Ultra-High Frequencies <i>Harold Straubel</i>	10
Coming — Two Way Five-Meter Tests	13
New England Division Convention (Announcement)	13
Stabilizing Superheterodyne Performance <i>James J. Lamb</i>	14
Strays	17
The December Transcons <i>E. L. Battey</i>	18
Simplified Remote Control for Amateur Transmitters <i>Henry T. Hayden, Jr., W2FO</i>	27
Information Service Rules	28
Some Notes on Message Handling <i>Paul M. Segal</i>	29
The Old "Peaked Audio" Receiver Rebuilt <i>Amos Doolittle</i>	30
Silent Keys	31
A New Aluminum Solder	31
DX Contest. H.A.R.T.S.	31
Here's How — <i>Recalled by W8UC-W4CA</i>	32
The Economical Design of Smoothing Filters <i>F. S. Dellenbaugh, Jr., and R. S. Quimby</i>	33
Experimenters' Section	
A CONVERTER FOR THE ULTRA-HIGH FREQUENCIES — A MULTI-RANGE MILLIAMMETER — VACUUM TUBE RELAY FOR THERMOSTATS — REMOTE CONTROL MADE SAFE	42
I.A.R.U. News	44
Calls Heard	46
The Communications Department	47
Correspondence Department	66
Hamads and QRAs	91
QST's Index of Advertisers	94

APRIL
1932

VOLUME XVI
NUMBER 4

Kenneth B. Warner (Secretary, A.R.R.L.), Editor-in-Chief and Business Manager; Ross A. Hull, Associate Editor; James J. Lamb, Technical Editor; George Grammer, Assistant Technical Editor; Clark C. Rodimon, Managing Editor; David H. Houghton, Circulation Manager; C. Donald Meserve, Advertising Manager; Ursula M. Chamberlain, Assistant Advertising Manager.

Advertising Offices 55 West 42d Street, New York City
Editorial Offices 38 La Salle Road, West Hartford, Conn.

Subscription rate in United States and Possessions and Canada, \$2.50 per year, postpaid; all other countries, \$3.00 per year, postpaid. Single copies, 25 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 9, 1922. Additional entry at Concord, N. H., authorized February 21, 1929, under the Act of February 28, 1925.

Copyright 1932 by the American Radio Relay League, Inc.
Title registered at United States Patent Office.

LONG and SHORT WAVE

WORLD-WIDE RECEPTION

WITH TRUE SPARTON QUALITY AND PERFORMANCE



**NO COILS
OR CONNECTIONS
TO CHANGE**

Model 60 **SHORT-WAVE
CONVERTER**—Full AC operation
with integral voltage and current
supply system.

WITH the new Sparton Model 60 Short-Wave Converter you can transform any standard AC broadcast receiver into a short-wave Superheterodyne by simply plugging into light socket and connecting the aerial and ground wires.

There are no coils to plug in or take out. Frequency changes are made automatically by the Sparton Band Selector Switch, permitting rapid selection of the frequency band desired.

Long experience and outstanding success in the development of short-wave receivers for police work was of great value to Sparton engineers in producing the new Sparton Short-Wave Converter and the new Sparton Multi-Wave sets.

Sparton Automobile Radio has been adopted by more police departments than any other make. And these new Multi-Wave Spartons are certain to be the first choice of discriminating radio listeners, who demand true Sparton quality and performance in both long and short wave reception.

THE SPARKS-WITHINGTON COMPANY
(Established 1900)
JACKSON, MICHIGAN, U. S. A.



Model 16 AW—A de luxe
12-tube Superheterodyne in a console
of characteristic Sparton richness.
Two separate tuning controls provide
exceptional operating simplicity. A
turn of the band selector and control
knob instantly adapts this super-
modern instrument for either long
or short wave reception. Super-sonic
chassis, Automatic Volume Control,
Tone and Static Control, Phono
Pick-up Jack and all other latest
Sparton features.

SPARTON RADIO

*"Radio's
Richest Voice"*

Only Sparton has the Musical Beauty of Sparton



Radio



Refrigerator



Home
Movie-Talkies



Automobile Radio



Tubes



Automobile
Warning Signals

(782)

Section Communication Managers of THE COMMUNICATIONS DEPARTMENT, A. R. R. L.

Eastern Pennsylvania Maryland-Delaware-District of Columbia Southern New Jersey Western New York Western Pennsylvania	W3GS W3NY W3SM W8DSP W8CFR	ATLANTIC DIVISION Jack Wagenseller Harry Ginsberg Robert Adams, 3rd Don Farrell Robert Lloyd	210 Main St. 2305 N. Pulaski St. 1302 Keswick Ave. 213 Hickok Ave. 175 Allegheny Ave.	Pennsburg Baltimore, Md. Haddon Heights Syracuse Emsworth (Pgh) Pa.
Illinois Indiana Kentucky Michigan Ohio Wisconsin	W9APV W9BKJ W9BAZ W8DMS W8BAH W9VD	CENTRAL DIVISION Fred J. Hinds George Graue J. B. Wathen, III R. J. Stephenson Harry A. Tummonds C. N. Crapo	3337 Oak Park Blvd. 824 Home Ave. Mockingbird Valley 216 Florence Ave. 2073 West 85th St. 2111 E. Newton Ave.	Berwyn Fort Wayne Louisville Highland Park Cleveland Milwaukee
North Dakota South Dakota Northern Minnesota Southern Minnesota	W9BVF W9DMS W9CTW W9AIR	DAKOTA DIVISION Guy L. Ottinger Howard Cashman Raymond Weihe Herman Radloff	326 6th Ave., So. 121 N. Spring Ave. E. 3rd St. R. 2, Box 15	Jamestown Sioux Falls Delano Sleepy Eye
Arkansas Louisiana Mississippi Tennessee	W5ABI W5WF W5AZV W4SP	DELTA DIVISION H. E. Velte F. M. Watts, Jr. William G. Bodker James B. Witt	4017 West 10th St. 1716 Park Ave. 208 W. Elm St. 732 N. Fifth Ave.	Little Rock Shreveport Jackson Knoxville
Eastern New York N. Y. C. & Long Island Northern New Jersey	W2LU W2BGO W2WR	HUDSON DIVISION Robert E. Haight V. T. Kenney A. G. Wester, Jr.	1080 Helderberg Ave. 3330 Fenton Ave. 550 Princeton St.	Schenectady Bronx, N. Y. C. Maplewood
Iowa Kansas Missouri Nebraska	W9FFD W9CET W9RR W9FAM	MIDWEST DIVISION George D. Hansen J. H. Amis L. B. Laizure Samuel C. Wallace	Box 27 915 Lincoln Ave. 8010 Mercier St. Green St.	Salix Topeka Kansas City Clarks
Connecticut Maine Eastern Massachusetts Western Massachusetts New Hampshire Rhode Island Vermont	W1CTI W1CDX W1ASI W1JV W1ATJ W1AWE W1BD	NEW ENGLAND DIVISION Frederick Ellis, Jr. John W. Singleton Joseph A. Mullen Leo R. Peloquin V. W. Hodge N. H. Miller Roy Gale	19 Merrill Rd. Box 161 16 Mercier St. 24 Arthur St. 227 Main St. 25 Phillips St. 41 Beacon St.	Norwalk Machias Ashmont Worcester Claremont Providence Barre
Alaska Idaho Montana Oregon Washington	K7PO W7AKZ W7AAT-7QT W7ALO W7RT	NORTHWESTERN DIVISION Richard J. Fox Oscar E. Johnson O. W. Viers Dr. Dolph L. Craig John P. Gruble	Box 301 422 Antone St. 701 First National Bank Bldg. 1921 Atlantic St.	Ketchikan Sandpoint Red Lodge Salem Seattle
Hawaii * Nevada Los Angeles Santa Clara Valley East Bay * San Francisco Sacramento Valley Arizona Philippines San Diego San Joaquin Valley	K6COG W6EAD W6HT W6NX W6ZM W6WB W6AXM W6BJF K6ISL W6EOP W6BVY	PACIFIC DIVISION C. D. Slaten Keston L. Ramsay H. E. Nahmens F. J. Quement S. C. Houston C. F. Bane Paul S. Farrelle Ernest Mendoza I. S. Limer Harry A. Ambler E. J. Beall	Pearl City 1151 Buena Vista Ave. Box 903 1348 Hanchett Ave. 3164 Bona St. 262 Castro St. 1326 P St. 1434 East Madison St. Care Manila Bulletin 4101 Hamilton St. Box 246	Oahu Reno Long Beach San Jose Oakland San Francisco Sacramento Phoenix Manila, P. I. San Diego Newman
North Carolina Virginia West Virginia	W4DW W3AAJ W8HD	ROANOKE DIVISION H. L. Caveness R. N. Eubank C. S. Hoffman, Jr.	State College 2817 Montrose Ave. 126 Washington Ave.	Raleigh Richmond Wheeling
Colorado Utah-Wyoming	W9ESA W6DPJ	ROCKY MOUNTAIN DIVISION Edward C. Stockman C. R. Miller	618 So. Williams St. 134 E. 2nd North St.	Denver Provo, Utah
Alabama Eastern Florida Western Florida Georgia-So. Carolina-Cuba- Isle-of-Pines-Porto Rico- Virgin Islands	W4AHP W4NN W4MS W4SS	SOUTHEASTERN DIVISION Robt. E. Troy, Jr. Ray Atkinson Edward J. Collins J. C. Hagler, Jr.	516 Cloverdale Rd. 43 East 59th St. 516 North Palafax St. 2424 McDowell St.	Montgomery Jacksonville Pensacola Augusta
Northern Texas Oklahoma Southern Texas New Mexico	W5RJ W5GF W5ZG W5AUW	WEST GULF DIVISION Roy Lee Taylor W. J. Gentry H. C. Sherrod Jerry Quinn	1614 St. Louis Ave. 538 N. Pottenger St. 1906 Wheeler St. 524 West Coal Ave.	Ft. Worth Shawnee Houston Albuquerque
Maritime	VE1DQ	MARITIME DIVISION A. M. Crowell	69 Dublin St.	Halifax, N. S.
Ontario	VE3HB	ONTARIO DIVISION H. W. Bishop	253 Elgin St.	London
Quebec	VE2AC	QUEBEC DIVISION Alphy Blais	Box 221	Thetford Mines
Alberta British Columbia	VE4HM VESAL	VANALTA DIVISION C. H. Harris J. K. Cavalsky	10806 125th St. 4868 Blenheim St.	Edmonton Vancouver
Manitoba Saskatchewan	VE4RC VE4FC	PRAIRIE DIVISION John L. Green W. J. Pickering	115 Furby St. 514 19th St., W.	Winnipeg Prince Albert

* Officials appointed to act until the membership of the Section choose permanent SCM's by nomination and election.

LEEDS SAYS—

For years we have been selling the best in Radio at lowest prices in the country. Our thousands of friends can vouch for this.

NOW for the first time in our history We Will Run a One Month Sale APRIL 1st to 30th, ONLY

Our entire building is to be remodeled—men need room to work. Rather than move our goods to storage, paying cartage and storage charges, we will give you, our friends, the advantage in price savings. Half of our stock must be sold during the month of April. Look at these prices or better still

COME IN AND LOOK AROUND

National factory wired S.W. 3; A.C. or D.C. Less coils.....	\$29.88
National factory wired S.W. 5; D.C. Less coils.....	38.22
National factory wired S.W. 5; A.C. Less coils and pack.....	49.87
<i>All type National coils can be bought singly or in pairs</i>	
Bosch 210 Amplifier with Magnavox Dynamic speaker; also 2½ volt and B supply, suitable for operation with the D.C. — S.W. 3; uses two 281 rectifiers. Regular price \$70. Special for April.....	9.95
R.E.L. No. 278 Band Spread Receiver at a special price.	

LOOK AT THESE VALUES

DeForest receiving Tubes—guaranteed Firsts
At these prices why buy anything but DeForest?

401-A.....	\$.34	435.....	\$.72
410.....	2.25	436.....	1.26
412-A.....	.72	437.....	.79
422-A.....	1.80	438.....	1.26
424-A.....	.72	439.....	1.26
426.....	.43	445.....	.50
427.....	.45	447.....	.70
430.....	.72	450.....	2.25
431.....	.72	480.....	.45
432.....	1.04	481.....	2.25
433.....	1.26		

ALUMINUM SHIELD CANS

See our prices in Jan. 1932 issue

For April deduct 10%

FLECHTHEIM condensers can always be depended on.

Look at these values for April

	Thickness	Price	Net
T.C. 100 1 mfd 1000 v. D.C.....		\$3.75	\$2.03
T.C. 200 2 mfd 1000 v. D.C.....		6.50	3.50
T.C. 400 4 mfd 1000 v. D.C.....		11.00	5.94
T. 100 1 mfd 1500 v. D.C.....		10.00	4.73
T. 200 2 mfd 1500 v. D.C.....		8.00	4.25
T. 400 4 mfd 1500 v. D.C.....		14.00	7.56
T.H. 100 1 mfd 2000 v. D.C.....		10.00	4.73
T.H. 200 2 mfd 2000 v. D.C.....		15.00	7.29
T.H. 400 4 mfd 2000 v. D.C.....		25.00	13.50
H.P. 100 1 mfd 3000 v. D.C.....		20.00	10.80
H.P. 200 2 mfd 3000 v. D.C.....		32.50	17.55
H.P. 400 4 mfd 3000 v. D.C.....		60.00	32.40
Aerovox 1 mfd 3500 v. oil condenser.....			9.50

SHEET ALUMINUM CUT TO ANY SIZE

Thickness	Price
1/32".....	6/10c per sq. inch
1/16".....	7/10c per sq. inch
3/32".....	3/4c per sq. inch
1/8".....	1c per sq. inch
3/16".....	1½c per sq. inch
1/4".....	2c per sq. inch

Slotted corner material 20c per ft.

Leeds uncased 866 Filament Transformer; 2½ volts at 10 amps; 10,000 volt insulation..... \$2.95

LEEDS TRANSFORMERS—Our latest model—steel encased with Bakelite panel at top. Most types have tapped primaries. Previous jobs were open cord models.

Leeds special filament transformer 1-7½ volt center tapped winding at 7 amps. Extra special for April..... \$3.95

Leeds special filament transformer 2-7½ volt, center tapped winding at 4 amps each. Special for April..... 6.25

Leeds special filament transformer 3-7½ volt center tapped winding at 3 amps each. Special for April..... 8.50

Leeds special 866 filament transformer 2½ volts 10 amps, 10,000 volts insulation. Special for April..... 3.95

Leeds special filament transformer 10 volts, center tapped 7½ amps. Special for April..... 5.65

Leeds special filament transformer 1-12 volt center tapped winding at 8 amps. Special for April..... 5.95

Leeds special filament transformer 1-14 volt center tapped winding at 8 amps. Special for April..... 7.50

THORDARSON TRANSFORMERS

2124-A—a half wave power transformer with one 7½ volt 2 ampere center tap filament winding. One 7½ volt winding and 281 rectifier tube connected internally to a 600 volt winding. 2-30 henry chokes are enclosed.

2572—This unit has the same connections as the 2124-A except a single low resistance choke is provided instead of 2 chokes. Both units will furnish complete A, B and C power for a single power amplifier or buffer stage.

2115—This transformer has a high voltage winding with 375 volts on a side. A 5 volt winding for a 280 rectifier is provided together with 2-30 henry chokes. This unit will furnish ample power for a specification amplifier employing 245 tubes.

Any one of them — Special for April..... \$1.95

Acme 30 K.C. transformer..... \$4.45

General Radio 30 K.C. transformer..... .40

R.C.A. UV 712 transformer..... 1.10

Sangamo Audio transformers 3 to 1..... .85

DeForest Audio transformers..... .40

2½ volt 10 amp Fil. transformer..... 1.25

General Radio No. 391 Power transformer 220-0-220 volt and two 5 v. winding..... 1.25

Acme variable ratio audio transformer..... .75

General Radio audio transformer 3 to 1 and 6 to 1..... 1.20

CONDENSERS

Hammerlund .001 variable condenser..... \$1.25

Haynes Griffen .00023 variable condenser..... .25

Cardwell 153-B-.00033 variable condenser..... 1.15

Hammerlund 4 gang .00035 condenser..... .95

Marco Midget variable condenser .15 mfd..... .19

Sangamo 5000 v. condenser; all sizes..... 1.80

Aerovox 5000 v. type 1457— .0001 to .00025..... .70

" " " " .0005 and .001..... .85

" " " " .002..... 1.00

" 2500 " " .0001 to .001..... .50

" " " " .002..... .45



45 Vesey Street, New York City
New York Headquarters for Transmitting Apparatus
WHEN IN TOWN VISIT OUR STORE

MAIL ORDERS FILLED SAME DAY

10% Cash
Must Accompany All
C. O. D. Orders

CONDENSER CORP. OF AMERICA UNITS

Brand New. At Sensational Prices

2 mfd.—4 mfd. 600 v. D.C. size 2 1/4 x 3 1/4 x 5	\$1.25
1 mfd. 600 v. D.C. size 2 1/4 x 2 1/4 x 1 1/4	.50
2 mfd. 200 v. D.C. flat mount 2 x 1 1/4 x 1 1/4	.35
3-1 mfd. 400 v. D.C. flat mount	.30
25 mfd. 600 v. D.C. uncase	.15

DUBILIER CONDENSERS

903 3 mfd 400 v. D.C.	\$7.75
903 7 mfd 400 v. D.C.	1.25
907 1/10-1/4-1/2 mfd 200 v. D.C.	.15
907 1 mfd 200 v. D.C.	.25

SPECIAL OFFER ON WESTON METERS

For April only — every Weston meter at 25% and 2% off regular list price

FREE with every purchase of a Weston meter a 75c Air Gap socket FREE.

This is the ideal socket for 866 tubes or any other rectifier tube.

This Offer also applies to JEWELL meters.

WESTON & JEWELL — Brand new — pin jack volt meters; 0 to 5 volt. List \$7. Special.....\$1.75

THORDARSON TRANSFORMERS AND CHOKES

Special for April — On the complete Thordarson line 40% and 10% off regular list prices.

LEEDS Bleeder Resistors and Transmitter Grid Leaks made by H. & H. For prices, sizes and details, see page 11 Winter Edition Radio Amateur Call Book.

For April only — 10% off our Special prices

Sub-panel bases — stamped steel; size 13 x 18 1/2 x 1 1/4 high; worth \$2.50. Special.....	\$5.50
Sprague 8 mfd electrolytic condensers.....	.60
Tungsol 8 mfd electrolytic condensers.....	.40
Aerovox 4 mfd electrolytic condensers.....	.85
Aerovox 8 mfd electrolytic condensers.....	.95
Aerovox 4 mfd electrolytic condensers.....	2.05
Aerovox 8-8-8 mfd electrolytic condensers.....	2.55
Aerovox 8-8-8-8 mfd electrolytic condensers.....	3.42
Thordarson 30 Henry 85 Mil. choke 400 ohm.....	.69
R.C.A. Victor 30 Henry 125 mil choke D.C. resistance 200 ohm.....	.79
Leeds 50 watt sockets.....	.95
Leeds A.C.—D.C. Keying Relay.....	1.25
Leeds 75 watt 211 Tube (Thoriated Filament) while they last.....	10.00
Mesco Spark Coil — \$5.00 Mesco Spark Gap.....	.25
General Radio Coil forms, No. 277, 3 for.....	.69
Air Gap UX sockets. List 75c.....	.24
Eby Isolantite UX socket, \$1.18 Eby Isolantite UY socket.....	.19
Western Electric 5 wire shielded cable; per foot.....	.03
Battery cable, 6 wire \$1.19 Triad tubes 866.....	2.95
Radio Amateur Call Book; latest issue.....	.80
Radio Amateur Hand Book; 9th Edition.....	1.75
Eby Imported 4000 ohm featherweight phones.....	4.60
Original Baldwin phone with the genuine mica diaphragm.....	
Universal Mikes with transformer 40% and 5% off list during April.....	
American double button Mike, model C.D. List \$23, for April.....	9.75
Leeds desk mike stand.....	2.45
Leeds floor mike stand; adjustable type.....	5.75

LEEDS Crystal Control Equipment

Crystals, Y cut, guaranteed within 1/10 of 1% of specified frequency, in 160 or 80 meter band.....	\$4.35
Oscillating Crystals, Y cut, completely finished, just outside the 80 meter band.....	2.25
Crystal holder, dustproof usually \$2.50. Now.....	1.89
Crystal holder, dustproof, type A— usually \$3.50. Now.....	2.15
#10 precision type.....	3.45
Airplane type Mercury column thermostat ± 1/2°c. set at 55°c. 5.00	

Remember LEEDS is Headquarters for 56 MC

Receiver kit described in July issue, only.....	\$14.75
Completely wired and tested 5 meter receiver built under the supervision of W2AOE.....	22.00
Push pull X Mitter kit described in the G.R. Experimenter.....	18.50
Completely wired and tested.....	24.50
Cardwell 411 B split stator double spaced Trans. Cond....	2.16

New Improved **Martin Vibroplex**, each..... \$17.00

FREE — with each Martin Vibroplex, 2 boxes of **Durham** metalized resistors — latest type — pigtail connections — in the following sizes:

6 Resistors 2 watt 100,000 ohms	6 Resistors 1 watt 250,000 ohms
4 Resistors 2 watt 50,000 ohms	6 Resistors 1 watt 500 ohms
2 Resistors 2 watt 25,000 ohms	2 Resistors 1 watt 2,000 ohms

The cost of these resistors are — 12 of the 2 watt @ 40c \$4.80 — 14 of the 1 watt @ 30c \$4.20 less 40%

CARDWELL CONDENSERS

At These Special Prices

Type B. — S.L. Cap.	S.L.F. taper plate	Midway receiving Cond.
188-B \$2.88	201-E \$2.28	402-B \$1.26
154-B 2.28	191-E 2.28	403-B 1.31
141-B 2.33	167-E 2.28	404-B 1.37
152-B 1.50	168-E 2.33	405-B 1.42
123-B 2.70	169-E 2.38	406-B 1.52
137-B 3.25	192-E 2.50	407-B 1.71

Mid. Double Sp. Trans. Transmitting Cond. Midget Balancer Cond.

408-B \$1.53	164-B \$2.85	603-A \$6.00
409-B 1.65	T-183 5.70	605-A .75
410-B 1.88	T-199 5.70	607-A .75
411-B 2.12	147-B 5.70	609-A .75
412-B 2.28	511-B 2.35	611-A .90
413-B 3.23	513-B 4.12	613-A .90

Western Electric black push back wire No. 18 — 100 feet... \$5.50

Pilot plug in coil forms, each.....	.35
Kursh Kaah 3 inch vernier dial.....	.45
Kursh Kaah 4 inch vernier dial.....	.55
Kursh Kaah 4 inch black dial.....	.25
Pathe 4 inch dial.....	.20
Radion 3 inch dial.....	.10
Pyrex radio insulators 3 1/2 inch.....	.17
Pyrex radio insulators 7 1/4 inch.....	.65
Pyrex radio insulators 12 1/4 inch.....	2.00
Pyrex small lead in bowls and bushings, complete set.....	1.40
Pyrex lead in bowls only; 4 3/4" high, outside dia. 6 1/16; each.....	.65
Pyrex 67018 — 3 inch standoff insulator; each.....	.95
New speed bug, approved by U. S. Signal Corps; adjustable from 10 to over 50 words per minute; List \$20. Now.....	9.45
Signal high frequency buzzer. Now.....	.70
Signal R-68 wireless practice set.....	1.90
Signal Sematic key, semi automatic and double action; type M-200. List \$18. Now.....	10.45

WESTON METERS..... \$5.00

Over 500 were sold in three weeks — only the following numbers still left — and only a few of each at that. Better get yours now. The price is still \$5.00. See page 89 — March QST for description.

0—30	M.A.	D.C.	0—15 V.	D.C.
0—150	"	"		

LITTLEFUSES — Complete assortment of sizes at special prices.

We have hundreds of other items at big price reductions for April. Lack of space makes us unable to list them. Write for special prices on anything you need.

And Last But Not Least

A revolutionary tube, the type 888 half wave Mercury Vapor Rectifier. Filament 2 1/2 volts 2 amperes 7500 volt inverse peak, 15 volt drop, and a 300 mil capacity will replace the 281-M and 866 and two 888* the 280-M. No filament preheating required, plate and filament voltage may be applied simultaneously! Time delay relays and separate transformers are unnecessary. Special price \$2.00 with a 30 day guarantee.

\$2.00

Remember These
Prices Hold Good
Only Until
April 30th, 1932

45 Vesey Street, New York City
New York Headquarters for Transmitting Apparatus
WHEN IN TOWN VISIT OUR STORE



The American Radio Relay League

DIRECTORS

President
HIRAM PERCY MAXIM.....W1AW
Drawer 2102, Hartford, Conn.

Vice-President
CHARLES H. STEWART.....W3ZS
St. David's, Pa.

Canadian General Manager
ALEX. REID.....VE2BE
169 Logan Ave., St. Lambert, P. Q.

Atlantic Division
EUGENE C. WOODRUFF.....W8CMP
234 W. Fairmount Ave., State College, Pa.

Central Division
LOREN G. WINDOM.....W8GZ-W8ZG
1375 Franklin Ave., Columbus, Ohio

Dakota Division
LAWRENCE E. LINDESMITH.....W9GKO
1053-85th Ave. W., Duluth, Minn.

Delta Division
M. M. HILL.....W5EB
P.O. Box 274, Natchitoches, La.

Hudson Division
A. LAFAYETTE WALSH.....W2BW
220 West 42d St., New York City

Midwest Division
H. W. KERR.....W9DZW-W9GP
Little Sioux, Iowa

New England Division
FREDERICK BEST.....W1BIG
13 East Crescent St., Augusta, Maine

Northwestern Division
K. W. WEINGARTEN.....W7BG
3219 No. 24th St., Tacoma, Wash.

Pacific Division
CLAIR FOSTER.....W6HM
Carmel, Calif.

Roanoke Division
W. TREDWAY GRAVELY.....W3BZ
Box 245, Danville, Va.

Rocky Mountain Division
RUSSELL J. ANDREWS.....W9AAB
169 So. Ogden St., Denver, Colo.

Southeastern Division
J. C. HAGLER, JR.....W4SS
2424 McDowell St., Augusta, Ga.

West Gulf Division
FRANK M. CORLETT.....W5ZC
2515 Catherine St., Dallas, Tex.

THE AMERICAN RADIO

RELAY LEAGUE, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

..... It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

..... "Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the world and has a history of glorious achievement as the standard-bearer in amateur affairs.

..... Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.

OFFICERS

President.....HIRAM PERCY MAXIM, W1AW
Hartford, Connecticut

Vice-President.....CHARLES H. STEWART, W3ZS
St. David's, Pennsylvania

Secretary.....KENNETH B. WARNER, W1EH
West Hartford, Connecticut

Treasurer.....ARTHUR A. HEBERT, W1ES
West Hartford, Connecticut

Communications Mgr., F. EDWARD HANDY, W1BDI
West Hartford, Connecticut

General Counsel.....PAUL M. SEGAL, W3EEA
1010 Shoreham Building, Washington, D. C.

Address all general correspondence to the executive headquarters at West Hartford, Connecticut

EDITORIAL

THE very limitations of the five-meter band appeal to us as endowing that band with particularly intriguing possibilities. "Fed up" as many of us must occasionally become with the more ordinary fields of amateur work, here is one that offers thrilling opportunity. It ought to appeal, in particular, to the chap who yearns after the good old days and who is prone to pine that there are no more worlds to conquer. Listen to us, old timers, and we'll sketch a little picture.

How far can we work with five meters to-day?

... Well, we can work 'cross-town, or fifteen miles, or perhaps twenty-five if the elevations are right. In other words, in this band we're right where 200-meter amateur radio was in the spark-coil days, with back-yard and 'cross-lots ranges. What an opportunity — what fun! — this band offers us to start all over again and once more live through those discouraging tribulations and those joyful achievements of "the good old days!" It's another world from the other amateur bands and it involves a willingness to "saw off" a while from most of one's fellows, but if a considerable group of us would go at this thing determinedly we could have some rare sport.

Suppose, for instance, there were a rather large number of us operating on this band with a range of 25 miles or so. We'd be likely to average about that separation between stations. Each of us would be able to hear and work only a few other stations. We'd *have* to relay our messages, and short-distance high-speed relaying would again become a fine art. We'd have a new spirit of comradeship. First thing we knew, we'd be organizing trunk lines of reliable stations between key cities so that stuff could get through, just as we did in 1914. It would be tough work, but gradually we'd improve. It would be unreliably reported that somebody had actually worked 75 miles, and how the rest of us would thrill to that possibility! After a while we'd have a pretty decent route from the east coast to Chicago, say. Then we'd get ambitious and try some "transcons." They'd fail at first, just as the old 200-meter ones did at first, and we'd hear serious talk as to how we needed a line of reliable stations 25 miles apart along the Union Pacific and the Southern Pacific to reach the west coast. Our number would grow and finally the great night would come! You have to be an old-timer really to know what it means to participate in one of the first transcontinental relays, but it's one of those once-in-a-lifetime emotional experiences!

Meanwhile technical improvement would

come and we'd find in our new five-meter world the counterparts of our old spark-day achievements of spark-through rotaries, one-turn primaries, fan aerials and round-round grounds, while the DX steadily mounted. Some industrious lad, figuring that he needed height for his quasi-optical waves, would try a small hydrogen balloon to support a thousand feet of piano wire as a Zepp antenna and would promptly work 467 miles. The following week the United States would be dotted with balloons and Malay tailless kites. Some ingenious chap would get up an automatic relaying rig and lanes of crack stations would lend themselves to through coast-to-coast work. Crystal control would be applied, to get the stability for heterodyne reception, doubling four times or perhaps working directly at the seventeenth harmonic of a 3500-ke. crystal, or more probably it would be tourmaline or one of its successors — anyway, we wouldn't recognize the gear if we could see it to-day. Finally some brilliant amateur would dope out how to achieve spitball polarization, of course and necessarily controlled by the large and shiny brass hand-wheel of our less lucid moments, and, presto! we'd have the final new triumphs of world DX!

Crazy? We don't think so. Impossible? No. Fantastic? Only slightly so. We can do those things, or something approaching them, if we try. Certainly the early stages of the picture are available to-day for all who will move themselves to action, and those will be the days of the real sport. What we need is to make a start.

Incidentally, the television folks, with a long eye to the future, are asking for 30 to 80 megacycles, interrupted only by our little band at 56-60 mc. — which latter, if they get the assignment, will surely be regarded as a nasty little thorn between two beautiful roses. It wouldn't hurt us a bit to show development and increasing occupancy. Quite seriously, though, we're not preaching as to how somebody ought to "show occupancy" to safeguard the band; we have been genuinely attracted to its possibilities for the highest kind of amateur enjoyment and sport if only a group of us will go at it simultaneously in a determined way. It almost seems to us that we might form a five-meter group in the A.R.R.L. for that purpose and do a bit of organized pioneering — not for glory or safety or even for science, but just because there is an unparalleled chance to start all over again and live through all the accumulated thrills of amateur radio. Any good?

K. B. W.

Fundamental Crystal Control for Ultra-High Frequencies*

Tourmaline Oscillators for Wavelengths Down to 1.2 Meters

By Harald Straubel**

Here is confirmation of exciting rumors that have been coming through from Germany since last fall. Practicable fundamental crystal control at the frequencies too high for quartz has arrived. Tourmaline crystal does the trick. The pleasure of presenting this article is the keener because of the friendly cooperation of the A.R.R.L.'s sister societies, the D.A.S.D. and the R.S.G.B., that have brought it to us. The connection with the D.A.S.D. of Dr. Straubel, the author, and that with the R.S.G.B. of Mr. Pilpel, the translator, make this contribution a fine feather in the cap of amateur radio. — Editor.

THE method of fundamental crystal control which has been used so far presents difficulties on frequencies higher than 6000 to 7500 kc. because very thin quartz oscillators produce side tones on several neighboring frequencies. This multiplicity of oscillations is noticeable

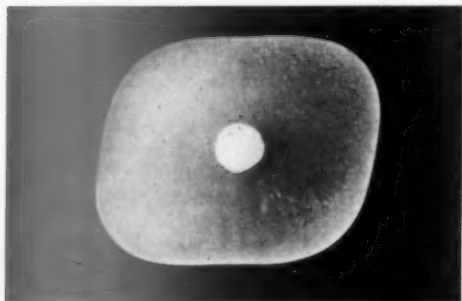


FIG. 1—LYCOPodium PATTERN OF TRANSVERSE OSCILLATION OF A QUARTZ PLATE CUT SO THAT VIBRATIONS STARTING AT THE CENTER ARE REFLECTED SIMULTANEOUSLY FROM THE CIRCUMFERENCE

The powder thus collects at the central nodal point.

even on longer waves but can be suppressed by cutting the quartz plate in a suitable shape. Fig. 1 shows such a plate. The surface and sides are ground so that all oscillations starting at the center will be reflected at the same time from the circumference of the crystal. The radius of the curves at the corners depends on the square root of the modulus of elasticity of quartz. If this plate is excited on its fundamental frequency, the whole plate oscillates in all directions. Lycopodium powder, uniformly distributed over the crystal plate, is therefore concentrated at the mid-

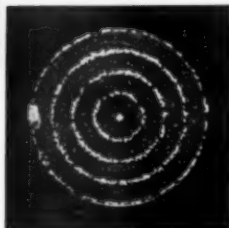
dle point, which is the nodal point of the whole disc.

For considerably higher frequencies than 6000-7500-kc. crystal-controlled short-wave transmitters nowadays do not often use this method, but employ quartz crystals with fundamental frequencies such as 3000 to 1500 kc., with frequency multiplication; that is to say, one uses harmonics of the crystal oscillator and amplifies them. An installation of this sort becomes very cumbersome and complicated when used on the ultra short waves because the harmonics are so weak that amplification must take place after every



FIG. 3—WHEN THE CRYSTAL OF FIG. 2 WAS MADE CIRCULAR THE PATTERN OF THE OSCILLATIONS BECAME MORE SYMMETRICAL, AS SHOWN BY THE CONCENTRIC RINGS OF LYCOPodium COLLECTED AT THE NODES

FIG. 2—LYCOPodium PATTERN ON THE SURFACE OF A "RAW" TOURMALINE CRYSTAL PLATE THAT WAS CUT PERPENDICULAR TO THE AXIS



frequency doubling before further frequency doubling is practicable.

If it were possible to construct fundamental oscillators for such short waves, the installation would be extraordinarily simplified.

TOURMALINE CRYSTALS

On the above-mentioned grounds, quartz is unsuitable for short-wave fundamental control. The

* Originally published in *Physikalische Zeitschrift*, December, 1931.

** Jena University, Jena, Germany. English translation by M. W. Pilpel, G6PP.

author has found, however, that a tourmaline crystal produces considerably more uniform oscillations than quartz. It was noticed even with

FIG. 4—CONTRAST THIS PATTERN OF A DISC-SHAPED QUARTZ OSCILLATOR WITH THOSE OF THE TOURMALINE SHOWN IN FIG. 3



a "raw" crystal, a plate simply cut perpendicular to the optical axis, that on exciting the longitudinal oscillations, extraordinarily uniform transverse oscillations resulted, as shown in Fig. 2.

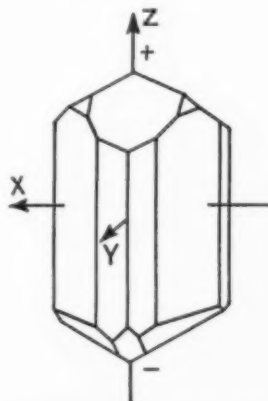


FIG. 5—IN THE TOURMALINE CRYSTAL THE OPTIC AND ELECTRIC AXIS HAVE THE SAME DIRECTION

The piezo-electric constant of tourmaline is

$$5.7 \times 10^{-3} \left[\frac{\text{Electrostatic Charge Units}}{\text{Kilograms}} \right]$$

i.e., about 10% less than quartz.

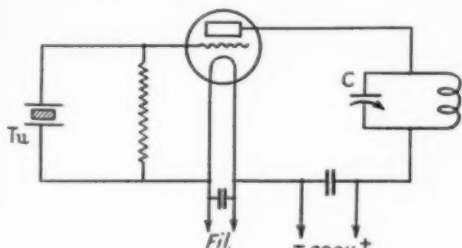


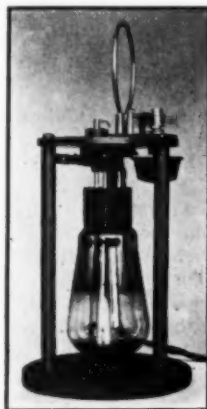
FIG. 6—THE TOURMALINE CONTROLLED OSCILLATOR CIRCUIT

It is of the same type as the familiar circuit generally used for quartz crystal control.

If, in spite of the smaller constants and the irregular natural formation of this crystal, particularly easy oscillations are noticeable, it is highly probable that this is because there is considerably less tendency to side-tone oscillation. Actually, in the natural crystal only a few symmetrical side tones could be detected and the frequencies of these were far removed from the fundamental.

From these results it can be assumed that the oscillating properties even of such a thin crystal will remain constant, as they must do if it is to be used for fundamental control of ultra short-wave transmitters. A further advantage for the production of very high frequencies lies in the high speed of sound, necessitated by the extraordinarily large elasticity modulus of 1,600,000

THE TOURMALINE crystal controlled oscillator operates at 75 megacycles (4 meters) with the stability and other characteristics of quartz-crystal controlled oscillators operating at much lower frequencies. Imagine the number of frequency multiplying stages that would be necessary to duplicate its performance with quartz crystal control!



kilograms per square centimeter in the direction of the optical axis. Tourmaline, therefore, supplies a frequency 35% higher than quartz of the same thickness, the constant being 80 meters wavelength per millimeter thickness.¹

CIRCUIT AND TUBES

A circuit for the production of the oscillations is shown in Fig. 6, while the photograph shows the actual transmitter for use on 7 meters and employing 5 watts. The simplicity of construction and absence of any type of screening are noticeable.

For waves down to 2 meters (150 mc.) ordinary detector or power valves were used (such as Telefunken RE 084 or RE 134), but for shorter waves a special short-wave valve was employed, the Valvo S 0401. For longer waves of 5 meters and upwards, a larger valve was found suitable, the RS 241, which is similar to the American Type

¹ Converting to the English system and in terms of frequency, $t = 146.25/f$, approximately, where t is thickness in inches, and f is frequency in kilocycles. The thickness dimension is parallel to the Z axis for tourmaline whereas it is generally parallel to either the X or Y axis for quartz. — EDITOR.

'10 and the Philips TB 04/10. It was noticed that, as is usual with all self-excited transmitters, the higher the frequency the lower the efficiency, oscillation eventually ceasing altogether. Fig. 7

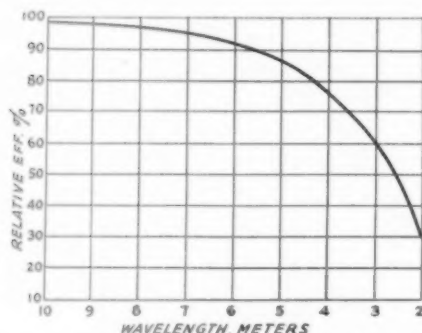


FIG. 7—PERFORMANCE CURVE FOR AN RE 134 VALVE WITH TOURMALINE CRYSTALS OF THE SAME DIAMETER BUT OF DIFFERENT THICKNESSES TO GIVE VARIOUS WAVELENGTHS

The efficiency decreases rapidly at the shorter wavelengths.

shows the performance of an RE 134 valve. The reason for this is partly the large self-capacity of the crystal which, for a given valve capacity, upsets the phase of the reaction on short waves to such an extent that the crystal no longer oscillates. The crystal then works only as short-circuit capacity while the valve either oscillates unstabilized or ceases to oscillate altogether. This can be avoided by reducing the capacity of the crystal, which can be done only by decreasing the diameter. An increase in the diameter does not enable the crystal to stand a greater load on these ultra short waves, however.

SUITABLE MOUNTINGS

The electrodes next presented certain difficulties. Silvering,² such as used in thick oscillators,

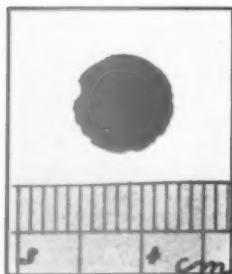


FIG. 8—AN ULTRA-HIGH FREQUENCY TOURMALINE CRYSTAL THAT WAS CRACKED NEAR THE EDGES FROM OVERLOADING WITHOUT IMPAIRING ITS OPERATION

The diameter of this plate is 8 millimeters (0.312 inch).

must be omitted as this affects the fundamental frequency of the thin plate quite considerably and a great load will cause peeling, although the oscillator remains undamaged. Therefore, silvering was dispensed with and perfectly level elec-

² Cf. Parsons, "Silvering Electrodes on Quartz Crystals," QST, March, 1932. — Editor.

trodes were used. Even slight unevenness of the electrodes caused certain parts of the crystal to melt and become disintegrated. Splintering, such as occurs with quartz, was never experienced.

By using perfectly plane electrodes the load on the crystal could be considerably increased. Working temperatures of more than 100° Centigrade did not affect the operation in any way. Great overloading (crystal 8 mm. diameter, RS 241 Valve with 350 volts plate potential) once caused the edge of the crystal to crack without affecting the middle portion or causing the efficiency to decrease materially. (Fig. 8)

When the crystal was in a horizontal position, no extra weight was placed upon the electrodes. Although an additional weight reduced the crystal's controlling properties, it was possible, in the cases of crystals of larger diameter (12 mm.), to subject them to pressures up to 500 grams per square centimeter before they stopped oscillating. In order to render them safe from shocks and vibrations, a light spring was always used to supply pressure.

PERFORMANCE

With the 75-mc. transmitter depicted experiments were carried out to determine the actual

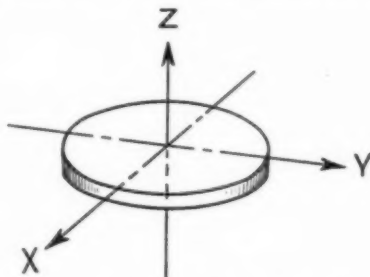


FIG. 9—THE TOURMALINE PLATE WITH RESPECT TO ITS THREE AXES

The major surfaces are perpendicular to the optic (Z) axis and parallel to the plane of the X and Y axes.

degree of frequency stabilization obtainable. The modulated transmissions were received on a simple detector with regeneration over a distance of 1 kilometer although no aerial was used for either transmitting or receiving. As far as the transmitter was concerned, no hand-capacity effects were noticed; but when the hand was placed near the inductance, reception was louder owing to the body acting as a capacity-coupled aerial. Only when the coil was actually touched did oscillation cease, to recommence immediately on the same frequency when the hand was removed. This was particularly noticeable when the transmitter was keyed in the plate circuit. The heterodyne note as heard in an oscillating receiver was absolutely pure on the frequency of 75 mc. (4 meters) and showed no frequency change whatsoever, better than could be obtained

when using a 7500-ke. quartz crystal. The well stabilized transmitted frequency in every case could be received on the detector with regeneration and without the need for the broad resonance curve of a super-regenerative receiver.

By varying the condenser *C* (Fig. 6) no jumping in frequency could be noticed. Naturally, the frequency of the tourmaline, just as that of quartz, was affected by varying the tuning of the plate circuit, but frequency jumping never took place. To obtain this condition, however, perfectly plane parallel crystal surfaces are necessary.

The temperature coefficient of tourmaline oscillators is about 10% greater than the average of quartz and is negative. Repeated measurements in the region of 20° to 60° Centigrade showed this coefficient to be 46.6 parts in a million per degree Centigrade. For an accurately constant frequency one must use a thermostat and heater, the cost of which is inconsiderable in comparison with the amount saved by the elimination of frequency-doubling and amplifying stages, and the simplification of the installation. For simple transmitters one can easily dispense with temperature control. The frequency change of tourmaline is always in proportion to the temperature variation.

Fig. 9 shows how the crystal plate is cut from the actual crystal. The position of the different axis is the same as in Fig. 5. Most suitable tourmaline crystals are found in Brazil and South Africa.²

In conclusion, I wish to offer my thanks to the firm of Carl Zeiss, Jena, Germany, for help in my experiments. In particular, without their great interest it would have been impossible to overcome the difficulties in construction of the shortest wave oscillators for 1.2 meters.

² We understand that the common black variety, known as *schorl*, is generally unsuitable. — EDITOR.

New England Division Convention

Providence, R.I., April 8th and 9th

THE PLACE: Providence, Rhode Island, Hotel Biltmore.

THE TIME: April 8th and 9th, Friday and Saturday.

THE SPONSORS: The Associated Radio Amateurs of Southern New England.

Every amateur is cordially invited to attend this year's convention. The best of speakers have consented to come to address the delegates and the entertainment committee is planning to keep everybody in the best of humor with stunts galore. Of interest to the old members of the R.O.W.H. will be an alumni meeting at 12 o'clock midnight Friday.

Plenty of publicity will be mailed to the radio amateurs, so let's all attend this convention. The registration fee is \$5.00.

Don't forget to write V. E. O'Neill, 74 Weybosset St., Providence, R. I., and tell him you will be there.

Coming—Two-Way Five-Meter Airplane Tests

THE first two Saturdays in April will be gala days for all five-meter experimenters — receiving, transmitting or both. An airplane carrying "five-meter" equipment will make some flights using the call W10XB and manned by two amateurs, Joseph Lyman of Chestnut Hill, Boston, owner and pilot of the 'plane; and D. Keily, student at M.I.T. and commercial first-class operator, who will handle the radio controls.

Mr. Lyman, former U. S. Marine pilot, has carried on experiments around 56 megacycles for some time and is interested in this part of the spectrum for air work. Recent tests between airplane and ground have shown possibilities of medium distance communication with very small voice transmitters — on one occasion A.R.R.L. Headquarters, using the low-power equipment in July and August QSTs, contacted two-way over a distance of 50 miles with maximum signal strength in both 'plane and at Hq.

The route to be followed on April 2d and 9th is: Boston-Hartford-New York City, New Jersey points and return via Pittsfield, Mass., to Boston. The flight will start at 12 noon on both Saturdays and last approximately five hours. This route has been selected because of the amateur interest in these localities. All during the flight W10XB will use voice and attempt to carry on two-way contacts with amateurs operating on the 56-60-mc. band. The frequency to be used by W10XB will be approximately 65,000 kc., which is just above the amateur band in frequency.

All amateurs on the East Coast are requested to keep a watch for W10XB and contact if possible, reporting results to A.R.R.L. Headquarters immediately for compilation and possible future experiments along the same line.

Should weather not permit flying for either Saturday the flight will be made the following Saturday.

Stabilizing Superheterodyne Performance

Electron-Coupled Oscillators Using Heater-Type Tubes

By James J. Lamb, Technical Editor

ALTHOUGH it is common to associate frequency stability almost exclusively with transmission and frequency measurement, and to consider lightly, if at all, the problem of frequency stabilization in such oscillators as may be involved in receivers, a current Hq. attack on c.w. receiver selectivity has shown strikingly the absolute need of a high order of oscillator frequency stability in a receiver that can make any pretense to the kind of selectivity we have in view. It has shown even more strikingly the utter inadequacy of the kind of oscillators that we had come to take for granted.

From the present point of view it is something of a paradox that we should have been so worshipful of oscillator stability for transmitters and, at the same time, so completely disrespectful of oscillator stability for the receivers in which well-nigh perfect signals were to be heterodyned. We now see in this lack of coördination between transmitter and receiver stability the explanation of a number of things. There isn't as much transmitter frequency "creeping" as was thought, for instance — a great deal of it is in the receivers; there aren't so many non crystal-controlled transmitters that actually merit "CCDC" reports — a really stable and highly selective receiver shows up even minute defects in less-than-perfect signals. But the rest of that must wait for a future issue of *QST*. The oscillator that satisfied the demand constitutes this story. Although the use specified for it here is in the superhet receiver, it is just as applicable to frequency meters, beat-frequency oscillators and general laboratory apparatus requiring a highly stable tuned oscillator that can furnish a little power to a load circuit without jumping off the reservation.

Just one of the several problems peculiar to superheterodyne receivers, and a particularly

touchy one in the case of the high-frequency superhet, is that of obtaining an oscillator-first detector combination in which the oscillator not only has a high order of frequency stability *per se* but also is capable of maintaining its intended frequency unaffected by the first detector circuit with which it is associated. It is not enough that it have only the kind of frequency stability that is relatively impervious to changes in supply voltages; it also must be practically impervious to rather drastic variations in its load circuit, for it is required to furnish power, small though that

power may be, to the first detector circuit. The oscillator load conditions are not constant. The first detector must be tuned. The degree of "pulling" of oscillator frequency with tuning of the first detector circuit seems to be, unfortunately, a matter of percentages and not one of a fixed number of kilocycles at all points in the frequency spectrum. Therefore an oscillator-first detector combination that may be entirely satisfactory in the broadcast range below 1500 kc. becomes completely hopeless as we go up through the high-frequency amateur bands. The superhet, with its dependence on a fixed arithmetical difference between signal and oscillator frequency to give its required intermediate frequency, is an intolerant thing in that respect.

Of the systems in vogue, using conventional oscillator circuits, those in which the oscillator output is coupled to some element of the first detector circuit not directly associated with its tuned input have been found by critical comparison to be least liable to this pulling effect. Of these the screen-grid modulation system shown by Howard

Chinn¹ seems better than the others while various schemes utilizing coupling to the detector cathode circuit appear less favorably. Perhaps the most

¹Chinn, "A High-Frequency Converter with Single-Dial Control," *QST*, June, 1931.

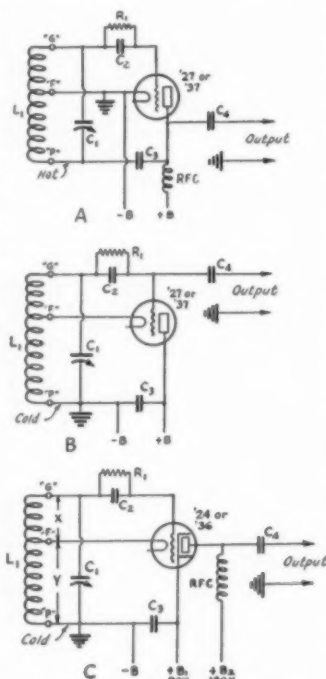


FIG. 1—THE EVOLUTION OF THE HARTLEY TYPE ELECTRON-COUPLED OSCILLATOR CIRCUIT FROM ITS TRIODE PARENT

effective arrangement is one in which a buffer or coupling tube is interposed between the oscillator output and the grid circuit of the first detector, a feature of the receivers used to pick up foreign broadcasts at Rocky Point.² This provides a degree of oscillator independence impossible with the simpler systems but is robbed of some of its appeal by the necessity for the extra tube and necessary coupling gadgets, especially of its appeal to one who finds the superhet already complicated enough and who is looking for simplification rather than complication of the animal. But the buffer is attractive — in fact doubly attractive because it provides not only the isolation we want but also because it can serve as an effective harmonic generator. Doubling, tripling and quadrupling the oscillator output frequency can be used for several ham bands; and, what is more, oscillator independence becomes truly complete when its harmonics, and not its fundamental, are used to heterodyne the signals in the first detector. Eliminate the coupling tube and, at the same time, improve oscillator stability — that would be something!

Well, we have it. Improved performance without complication and with actually better all-around frequency stability than the oscillator-buffer can deliver has been realized with modifications of the electron-coupled type of oscillator described recently by Lieutenant Dow.³ In this family of circuits a screen-grid tube is used with the cathode, control grid and screen grid forming the elements of the frequency-generating circuit while the plate is in the output circuit, shielded from the oscillator circuit proper by the screen grid. The coupling to the load circuit is electronic rather than capacitive or inductive, thereby greatly reducing effects of load circuit conditions transferred into the frequency generating circuit, in much the same way that they are reduced by the usual separate buffer amplifier. To effect this it is necessary that the

screen-grid or inner anode be at "ground" r.f. potential which, in turn, makes it necessary to have the cathode "up in the air." With tubes having directly heated cathodes (the usual "filament" types) it is requisite that the filament

leads be brought to the tube either through the tank inductance or that the filament be fed through r.f. chokes, an inconvenience in either case. With tubes having indirectly heated cathodes, however, it has been found completely satisfactory to operate the heater at "ground" r.f. potential and connect the cathode to its proper position in the frequency generating tank circuit. The inner-anode (screen-grid) end of the latter is grounded and connected to the negative side of the plate supply. Contrary to expectations, the r.f. potential difference between the heater and cathode does not seem to have any ill effect nor does the small heater-cathode capacity seem to be injurious. On the contrary, there is evidence that the variation in this capacity with temperature changes tends to compensate for other capacity-temperature effects, with the result that the frequency creep during warming-up is less than is usual with the same tubes in more conventional circuits. Coupled with the inherent dynamic self-stabilization that is characteristic of this type of oscillator, these properties make it fitted not only to the jobs offered in the superhet receiver, and in transmitters, but also, we believe, to a number of other jobs that beg for such stability.

TESTED CIRCUITS

Illustrating that there is nothing mysterious about the relationship between the Hartley of the electron-coupled type and the more familiar triode oscillator of the same family, Fig. 1 shows the evolution of the former from the latter. At "A" we have an old friend, the "conventional Hartley" (how many times have we read that in "Station Descriptions"?), with its cathode grounded and with shunt plate feed. Both ends of the tank are "hot" with r.f., as all who have burned their fingers on dial set-screws need not be reminded. At "B" we see a less familiar version of the same circuit, one that has been used

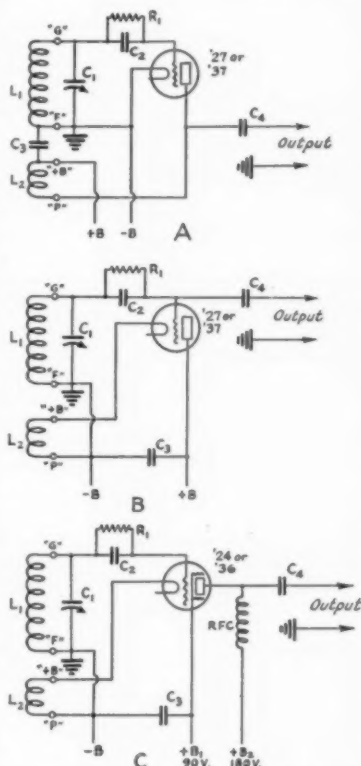


FIG. 2 — TRACING THE TUNED-GRID AND TICKLER VERSION FROM THE FAMILIAR REGENERATIVE TRIODE CIRCUIT

² Peterson, Beverage and Moore, "Diversity Telephone Receiving System," *Proc. I. R. E.*, April, 1931.

³ Dow, "Electron-Coupled Oscillator Circuits," *QST*, Jan., 1932.

little but which could be put to work nevertheless. One end of the tank circuit is now "cold," and the rotor of the tuning condenser can be grounded. The cathode is above ground as far as r.f. is concerned and the plate is brought to ground r.f. potential through the by-pass condenser C_3 . No r.f. choke in the plate feed is necessary. Coupling to the output circuit is shown from the grid, through C_4 , but could be taken off just

band-spread condenser utilizing a fixed minimum capacity in parallel with a tuning section works out very well. With battery "B" supply the voltages indicated on the diagram can be used, but with power-pack supply it is advisable to incorporate a voltage divider in the circuit, as shown in Fig. 3. The component specifications for both Figs. 1 and 2 are the same as those of corresponding designations in Fig. 3.

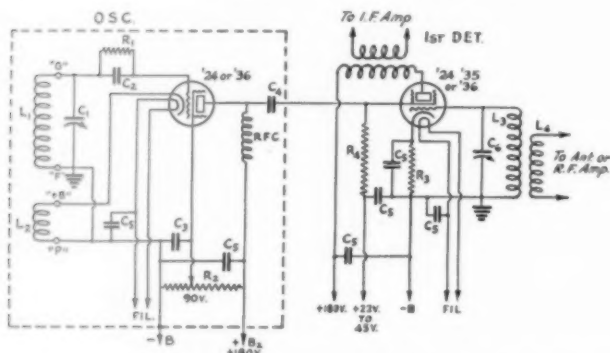


FIG. 3 — A TICKLER FEED-BACK E-C. OSCILLATOR AND FIRST-DETECTOR COMBINATION THAT CAN BE ADAPTED TO EXISTING RECEIVERS AND HIGH-FREQUENCY CONVERTERS

L_1, L_2, L_3, L_4 — Usual for frequency range covered. See "The Radio Amateur's Handbook."
 C_1 — Band-spread tuning condenser (Cardwell, General Radio, National or R.E.L.).

C_2 — Grid condenser, 100- to 250- μ fd. mica type.
 C_3 — Inner anode by-pass condenser, 0.01- μ fd.
 C_4 — Plate coupling condenser, 100- μ fd. mica fixed or midget variable.
 C_5 — By-pass condensers, 0.01- μ fd. or larger.
 C_6 — Usual grid tuning condenser, 100- μ fd. or smaller.
 R_1 — 100,000-ohm grid-leak.
 R_2 — Voltage divider, two 10,000-ohm 2-watt carbon-type in series.
 R_3 — Detector cathode (bias) resistor, 5000-ohm 1-watt carbon type.
 R_4 — Screen-grid coupling resistor, 50,000-ohm 1-watt carbon type.
RFC — Radio-frequency choke for oscillator frequency range.

Filament supply for '24 and '35 tubes, 2.5-volt a.c. with filament center-tap connected to "-B"; for '36 tubes, 6 volts d.c. with no filament center-tap. The same filament and plate supply can be used for both oscillator and first detector. Oscillator filament by-pass condenser C_3 should be connected directly to one filament (heater) socket terminal and must not be omitted.

as well, and perhaps to better advantage, at the cathode. The coupling condenser could be omitted, by the way, for direct coupling to the grid of an amplifier. Bias for the latter could be provided by a resistor between "-B" and its cathode. After "B" there isn't much of the mysterious about "C," the electron-coupled Hartley circuit. The screen-grid becomes the inner anode, taking the place of the triode's plate, and the load is coupled to the tetrode's plate. Although it does not look that way on the diagram, the best ratio of turns between cathode-grid and cathode-anode is about 2 to 1; that is, "X" should comprise approximately two-thirds of the total inductance and "Y" one-third. The tank circuit, L_1C_1 , preferably should be rather high-C — for instance like that of the dynatron frequency meters that have been described in *QST* and in *The Radio Amateur's Handbook*. The use of a

electron-coupled tuned-grid and tickler circuit from its triode parent. There is nothing mysterious about it, either, even though it appears like a misprint to have both the grid and plate connected to the "grid" circuit, the cathode connected to the tickler, and one side of the latter grounded. But it works in great style and does so with coils intended for a regenerative receiver. In fact it is used regularly, in our work, with an Aero automatic tuner "as is," covering the bands from 3500 to 14,000 kc. with band-spreading all the way. This arrangement is immediately adaptable to existing superhets and high-frequency converters that use tuned-grid coils, plug-in or otherwise, in the oscillator. The coil-terminal designations correspond to those for a triode tube and are given to make changing over less confusing.

Fig. 3 shows the circuit of an oscillator-first detector combination that originally was equipped with a triode oscillator. The only changes necessary were in the oscillator circuit. If the first detector coil-former happens to be equipped with a tickler winding it is suggested that the oscillator coupling condenser C_4 be attached to one end of it instead of to the screen-grid of the detector tube and that the other end of the tickler winding be grounded. This provides inductive coupling from the oscillator to the first detector grid circuit and is more effective than the screen-grid connection. Slight pulling of the oscillator frequency with tuning of the detector is probable at frequencies in the 7-mc. band and higher but this can be eliminated by using the second harmonic of the oscillator. With this coupling scheme the screen grid of the detector is connected directly to the "+22 V" tap and the resistor R_4 is omitted.

Shielding of the oscillator, indicated by the dash-line box in Fig. 3, is recommended — is necessary, rather, if the full capabilities of the

Hoffman and Mix, "Revolutionizing High-Frequency Tuner Design," *QST*, Feb., 1930.

system
latter
off by
cause
couple
but
on its
feeding
and g
this o

The
Jersey
of 56-
arden
tubes
the ho
12 sta
Lack

Our
some
Unort
that h
untun
detect
the ga
transf
work,

Test
purcha
lamps
the ma
them,
Believ
before
also. W

"FS
Handy
power

The
annual
time to
you ha
and ad

Miss
in this
duly q
With si

April,

system are to be realized. Any kind of an oscillator in any kind of a superhet should be screened off by itself, we have learned from experience, because unscreened it not only gets into crazy coupling entanglements with the detector circuit but also it may try to pick up and detect signals on its own, may operate as a secondary autodyne feeding the i.f. amplifier with troublesome beats and generally complicate things no end. That this oscillator can be adapted to the various QST

converters and to the one described in *The Handbook* goes without saying. But when the change is made it is suggested that the above suggestions regarding shielding be adopted also.

The rest of the story — about receiver frequency stability and “single-signal” c.w. selectivity? It’s on the fire. But no questions answered before it breaks in QST. So let’s talk about tourmaline crystal control and meet the mailman at the corner for the next month or so.



STRAYS



The Bloomfield Radio Club of Northern New Jersey has been one of the most active backers of 56-mc. communication. Recently D. A. Griffin, ardent member of this club, took his pair of '12 tubes to a hilltop two miles from home. Between the hours of 2 and 5:30 p.m. he worked a total of 12 stations ranging in distance up to 25 miles. Lack of breath was the reason for closing down.

Our Frankenstein Stray of last month can get some close competition. One fellow built an Unorthodox Receiver. In all sincerity he explains that he used d.c. instead of a.c. tubes, left off the untuned stage, did away with the screen-grid detector, eliminated the band spreading, avoided the ganging of tuning condensers and reverted to transformer coupling. Strangely, the set didn't work, and it was “built according to QST”!!!

Testing tubes can be carried too far. W9UZ, purchasing four of these newfangled photoflash lamps for taking flashlight photographs, asked the man behind the counter if he would “test” them, and waited to see what would happen. Believe it or not, the clerk blew up two of them before the proprietor came along and blew up also. W9UZ escaped and is still at large.

“FS” opines that these transmitting tests of Handy's ought to end the depression in the power industry.

BOARD MEETING SOON

The Board of Directors of A.R.R.L. holds its annual meeting in middle May. Now is the time to convey to your director the suggestions you have for bettering amateur radio. His name and address are on page 6 of any QST.

Miss Josephine Rohas, whose picture appears in this neighborhood, is possibly the youngest duly qualified and licensed YL ham in the world. With six months of solid amateur activity behind

her, Josephine still looks forwards to her fourteenth birthday in June. At brother Rod's station W8EKM she wields a fine fist almost nightly. Her other activities include planning stations for the Girl Scout troop headquarters, where she spends a deal of time, and for the local High



School, in which Josephine is a freshman. Schedules with other YL's (and with OM's for that matter) are requested.

There is another handy gadget manufactured locally which should be of interest to hams needing the necessary delay before applying voltage to their '66s. A double wall-type switch from all appearances, but one of the switches has a delay of 15 seconds before closing, is what we have run across, and is one of a list of dozens of variations all selling under the name of Mark-Time switches, made by M. H. Rhodes Company, Hartford, Conn.

A last resort to filter a refractory “B” supply when no additional filter apparatus is available is to hook a “B” battery, any size, any degree of defunctness, in series with the positive lead. The combined resistance and polarity effect completely eliminate supply hum.

— WICBD

The December Transcons

By E. L. Battey, Assistant Communications Manager

HOW fast can an amateur radiogram be relayed across the country and an answer be returned on the lowest of amateur frequency bands, 1750 kc.? How fast can a message travel from coast to coast and an answer be returned on the 3500-kc. band? Those were the questions foremost in the minds of hundreds of our most active operators as the dates of the December '31 Transcon Relays drew near. There were two twelve-hour transcons, the first from 4:00 p.m. (local time) December 5th until 4:00 a.m. (local time) December 6th and the second between the same hours December 12th and 13th. The first relay was confined to the 1750-kc. band, the second to 3500 kc. 'Phone and c.w. stations alike had messages to relay, and inter-change of messages was made between the two types of services.

THE 1750-KC. RELAY

In considering the 1750-kc. transcon we must consider the fact that activity on that band has been at a rather low ebb for the past several years. The desire to develop the higher frequencies lured old timers away from the "old 160-meter band," and the craving for DX, natural to every beginner, kept the neophytes on the higher frequencies. Consequently the 1750-kc. band "took a back seat" and was almost forgotten by the average amateur. However, decided changes are now taking place in radio conditions. High frequencies especially are suffering from these changes. The higher the frequencies the more "freaky" the conditions. 14 mc. and 7 mc. can no longer be depended upon to act the same two days in succession. And even 3.5 mc., haven of traffic handlers and schedule-keepers, is becoming undependable due to the tricks of OM Skip. The cry arises, "Let's do something about it!" The transcon was a means to that end.

The 1750-kc. transcon might be called a "revival test," to test the merits of that band and at the same time revive some of the old time interest in "160 meters." That our objective of reviving interest was reached, to some degree at least, is apparent from the following quotations taken from correspondence from participants in the relay: "The 1.7-mc. band showed the most activity that I've seen on it. . . ." "All districts heard and worked." . . . "It sounded like 3.5 mc. . . ."

Seventeen transcons were started in the 1750 relay, twelve from the east coast and five from the west coast. Of these seventeen, five, those started by W6BVY, W6AM, W1ANC, W1APK and

W4AMA, reached the opposite coast. Two of them, W6BVY's and W6AM's, made a "complete circuit," across the continent and reply back. W6AM's made a "closed circuit" by the reply arriving back at the starting station. W6BVY's transcon made the best MR²/T rating (miles \times number of relays squared \div the time in minutes), with W6AM's second. The best time was made by W6BVY's also, the message getting across and an answer back to him in 2 hours, 47 minutes. The next best from the standpoint of time was W4AMA's, which reached the west coast in 3 hours, 20 minutes. In point of traveling the greatest number of miles in the 12 hours of the relay, W6AM's leads all other messages having covered approximately 5500 miles. The routes traveled by all transcons are shown in tabular form, together with figures relative to the total miles traveled by each message, the number of relays, the miles per hop, the miles per hour and the rating MR²/T, which was also used to grade each transcon in the January '31 'Phone vs. C. W. Relay. A more detailed explanation of the rating is given elsewhere in this article.

Considerable difficulty was encountered on



"DIFFICULTY WAS ENCOUNTERED"

1750 kc. in spanning the Rockies. This caused many west-bound transcons to die in the midwest and prevented east-bound messages from getting

outside the Pacific time zone, and was due for the most part to the scarcity of stations using 1750 kc. Much better relaying could have been done had more stations been active. It is estimated that upwards of 100 stations were on the air during the 1750-kc. transcon! Of these, approximately 10% were using 'phone. The calls of 'phone stations are shown in italics in the routes to distinguish them from c.w. participants. A number of 'phone-c.w. QSOs were made during the relay, several messages being swapped from one service to the other. The 1750-kc. relay enables us to make a "safe estimate" of the number of miles over which reliable communication may be maintained on that band during the evening and night hours. The "average" miles per hop of all transcons starting in the relay was 410.4. It is safe to say, therefore, that reliable two-way work can be maintained over distances up to 400 miles (airline distance). 3500-kc. traffic men should note this fact in particular. The "average" traffic schedule maintained on 3500 kc. is certainly not *over* 400 miles. Why not make more use of 1750 kc. for schedule work, and at the same time get away from "skip effects," QRM, etc., so troublesome on the higher frequency bands? 3500-kc. 'phone men will find on "160 meters" a freedom never experienced on "80 meters"; on 1750 kc. they will find more territory and less QRM, a most acceptable combination.

THE SUMMARY TABLES

An explanation of the tables showing facts relative to each transcon is in order. The first column contains the "Number and Starting Time" of each message. Each message bore a special number consisting of four characters, a number, two letters, and a number. The starting time is always given in Eastern Standard or Pacific Standard Time depending from which coast the transcons started. The second column shows the routing and is for the most part self-explanatory. The starting station and the stations on the opposite coast receiving the messages are shown in boldface type. 'Phone stations' calls are shown in italics to distinguish them from c.w. It will be observed that several message exchanges were made between the two types of service. In cases where there is some irregularity in the routing or more than one route we refer you to "See alternate routes," which are elsewhere explained in this article. Next is the "Time" column, showing the time the message was being relayed, and "total time." First: (a) if a message reached the coast: (b) if a message reached the coast and a reply was received back at the starting station, the time is figured from the starting time to the time the message stopped traveling. Second: if a message did not get to the coast it was headed for, but died enroute, the time is figured two ways. (1) Since every message had until 4:00 a.m. local time to get across the continent,

messages not succeeding were penalized out of fairness to the other routes. Therefore, the time is figured from the starting time to 4:00 a.m. local time at the last station on the route, and the "total time" thus figured is used in grading the message. (2) So that stations on the incomplete routes may see the number of hours that the message they handled was *actually traveling* we are showing this time in brackets. The fourth heading "Total Miles" is the approximate number of miles that the message actually traveled. The next column shows the "Number of Relays" and needs no explanation. The "Miles Per Hop" is merely the total miles divided by the number of relays. And next comes the "Miles per Hour" column to see how speedy we are!

RATING THE TRANSCONS

The last column in the tables shows the relative "Rating" of each message. The relation, MR^2/T (the total miles \times the number of relays squared \div the time in minutes), which worked out so satisfactorily in grading the transcons of January '31, was again used in determining the "Rating." In view of the fact that a "transcon" is really not "transcon" until it reaches the opposite coast, it was decided that a message which failed to reach the coast it was headed for should be penalized for not making its objective. In order to place all messages on an equal basis 2500 miles was considered a fair average of the straight-line distance across the continent. If a message successfully reached the opposite coast it was considered "transcon" and its MR^2/T rating was divided by 2500/2500, or 1. In the case of messages which did not reach the coast, 2500, the distance across the continent, is divided by the total number of miles traveled by that message up to the closing time, and the MR^2/T rating for that particular message is divided by the result. Let us take for example W4DW's message No. 8ET6. The MR^2/T rating for this message was 37. It did not reach the west coast. It traveled 1735 miles. Therefore, in determining the rating for No. 8ET6 we have 37 divided by 2500/1735 (1.4), or a final rating of 26.4. In the case of a message traveling over more than one route the route making the best rating for the message is shown in the table, except in the case of routes made by "intercepting." An intercept route can be given no rating.

POOR RELAYING

Good message handling practise calls for an "acknowledgement" to be received at the sending station (and date, time, and call noted on the message blank) before a message can be considered "relayed" to another station. In the December transcons there were several outstanding examples of "poor relaying." It is unnecessary to cite the specific cases, but we do want to mention briefly just what sort of procedure this poor relaying was. First is the sin of "intercepting" a

<i>Number and Starting Time</i>	<i>Routing (1750 Kc.)</i>	<i>Time</i>	<i>Total Miles</i>	<i>No. of Relays</i>	<i>Miles Per Hop</i>	<i>Miles Per Hour</i>	<i>Rating</i>
Dec. 5th 5XN9 12:28 a.m.	W6BVY-W6AM-W9CDM-W9GTT- W8UP-W2FR-W8UP-W9GTT- W9CDM-W6AM (See alt. routes)	2 hrs. 10 mins.	5465	9	607	2522	3405.1
3LB6 9:55 p.m.	W6AM-W9CDM-W9ESL-W9GTT- W8UP-W1BCR-W8UP-W9GTT- W9ESL-W9CDM-W6AM (See alt. routes)	2 hrs. 47 mins.	5500	10	550	1976	3293.4
3SE4 5:13 p.m.	W1ANC-VE3GT-VE3DB-W9DKH- W9DEX-W9DMY-W9DI-W6BRV	6 hrs. 17 mins.	2720	7	388	433	353.5
2WZ5 5:00 p.m.	W1APK-VE3DB-W9DKH-W9DEX- W9DMY-W9DI-W6BRV	5 hrs. 10 mins.	2745	6	457	531	318.7
3GV6 8:25 p.m.	W1AOX-W1ANC-W8BFN-W8OK- VE3GT-VE3DB-W9DKH-W9DEX (died 1:48 a.m. C.S.T.) (See alt. routes)	8 hrs. 35 mins. (6 h. 23 m.)	1865	7	266	217 (292)	136.4
6GE9 6:15 p.m.	W4AMA-W9DMY-W9DI-W6BRV	3 hrs. 20 mins.	2500	3	833	750	112.5
7KN2 5:15 p.m.	W2ATB-W8APQ-VE3GT-W8BYD- W8BGY-W9DEX-W9DMY- W9DVQ-?? (See alt. routes)	11 hrs. 45 mins. (9 h. 3 m.)	1875	7	268	159 (207)	100.2
7LD4 8:42 p.m.	W2KG-W8APQ-VE3DB-W9DKH- W9DEX-W9DMY-W9DVQ-??	8 hrs. 18 mins. (5 h. 43 m.)	1725	6	287	208 (301)	89.
8SV3 6:20 p.m.	W2BNJ-W8APQ-VE3GT-VE3DB- W9DKH-W9DEX-W9DVQ-??	10 hrs. 40 mins. (9 h. 20 m.)	1730	6	288	162 (185)	69.5
4HS5 9:58 p.m.	W1AFB-VE3DB-W9DKH-W9DEX- W9DMY-W9DVQ-?? (See alt. routes)	7 hrs. 2 mins. (4 h. 20 m.)	1635	5	327	232 (377)	64.5
5PE4 1:40 a.m.	W1ADW-VE3GT-W8BYD-W9CTP- W9GAI-W9DEX (died 1:40 a.m. C.S.T.) (See alt. routes)	3 hrs. 20 mins. (1 hr.)	1250	5	250	375 (1250)	53.1
8FX9 8:38 p.m.	W8OK-W8BGY-W9DKH-W9DEX- W9DMY-W9DVQ-??	8 hrs. 22 mins. (5 h. 33 m.)	1350	5	270	161 (243)	37.3
7QF3 5:03 p.m.	W4AMK-W4AMA-W9ALS-W9DEX- W9DMY-W9DVQ-??	11 hrs. 57 mins. (9 h. 4 m.)	1440	5	288	120 (158)	29.5
8DX4 11:15 p.m.	W7KH-W7ALM-W7AVZ-W6AM (died 3:16 a.m. P.S.T.)	4 hrs. 45 mins. (4 h. 1 m.)	1095	3	365	230 (272)	15.5
2XV3 11:55 p.m.	W7ALM-W7AVZ-W6AM (died 3:23 a.m. P.S.T.) (See alt. routes)	4 hrs. 5 mins. (3 h. 28 m.)	1095	2	547	268 (316)	8.
9KX4 5:08 p.m.	W1EZ-W8BYD-W8ENZ-??	10 hrs. 52 mins. (32 mins.)	575	2	287	53 (1074)	.81
3AP5 8:30 p.m.	W7KZ-W6CHE-??	7 hrs. 30 mins.	700	1	700	93	.42

message while it is being sent to another station. An intercepted message is as good as none at all, in an organized relay especially. It only causes confusion when a message is intercepted and a new route started by the interceptor. It may be painful to stand idly by and listen to a message being transmitted to a station many miles further from the destination of the message than the location of your station, but it is "illegal" message handling practice to intercept such a message, and start a new route. The second sin in relaying and for which there is but little excuse is the matter of starting a message through more than

one station. This occurred in several cases during the transcons. In some of those cases the reason for giving the message to more than one station was that an acknowledgment had not been received from the station to whom it had been first relayed. That is okay. An acknowledgment *must* be received before a relay is complete. *But*, to give a message to a station and later give it to another station simply for the reason that the first station is having trouble in relaying it, is "unforgivable." If you feel the need to relay through another station, first communicate with the original station to whom you gave it, and advise

him of
the rad
let's d
The on
of an
deliver
the me
case y
tion at
radiogr
that it
relayed
station
the rel
Forget
forward

Thir
and 17
and on
3500-k
"poor
the op
circuit,
and we
W6NK
W3HC
W1P,
a "close
back to
standing
rating i
made th
W3CX)
it stopp
19,670
for the
closed c
both cr
received
minutes
making
best fro
making
minutes
speed is
did not
circuit"
W7ALM
that me
minutes,
bettered
coast in
sages fr
getting
they st
W6AM,
W2AUS
W6AHC
transcon
time as

him of your action and request that he "cancel" the radiogram. If we are going to relay messages, let's do it correctly. Never intercept messages. The one exception to the rule might be in the case of an emergency message when you feel you can deliver more quickly than the station to whom the message is being transmitted. But in such a case you must be sure to notify the sending station at once of your action, and in forwarding the radiogram, you should mark it suitably to show that it was "intercepted." And, when you have relayed a message to a station and received that station's acknowledgment for same, your part in the relay of that particular message is done. Forget about it, and look for other messages to forward.

THE 3500-KC. RELAY

Thirty-eight transcons (21 from the east coast and 17 from the west, including one from VE5BR and one from K6AJA) got under way in the 3500-kc. relay and, despite a nationwide report of "poor conditions," *twenty-two* messages reached the opposite coast. *Fifteen* made a "complete circuit," across the continent and answer back, and were started by W6BVY, W6CIS, W6AM, W6NK, W2AUS, W6FFU, W2BPY, W2CSC, W3HC, W3BWT, W1CDX, W1ASP, W7ALM, W1IP, and W6AHO. *Eight* of these fifteen made a "closed circuit" across the continent and answer back to the originating station. The most outstanding transcon from the standpoint of MR/T rating is that started by W6BVY. This transcon made three "round trips" between W6BVY and W3CXM, and then went back to W3CXM where it stopped. It traveled by 21 relays a total of 19,670 miles in 1 hour, 59 minutes. There is a tie for the distinction of "the fastest complete or closed circuit transcon." W6CIS' and W6AM's both crossed the continent and an answer was received back at the starting stations in *16 minutes*. Next fastest was started by W2AUS, making a "closed circuit" in *26 minutes*. Next best from a standpoint of speed was W6BVY's, making one complete "closed circuit" in *45 minutes*. And fifth in line for special mention for speed is W6AHO's, which although the answer did not get back to him, made a "complete circuit" in exactly *60 minutes*. The speed of W7ALM's transcon is also worthy of mention as that message reached the opposite coast in *11 minutes*, which speed for a one-way trip was bettered only by W6CIS', which reached the east coast in *10 minutes*. Considering the best messages from a strictly "transcon" angle (that is, getting a message across the continent *one way*) they stand as follows: W6CIS, 10 minutes; W6AM, 11 minutes; W7ALM, 11 minutes; W2AUS, 22 minutes; W6BVY, 32 minutes; and W6AHO, 54 minutes. We can say, then, that one transcon got across the continent in as short a time as *10 minutes*, a noteworthy achievement.

From an angle of traveling the "greatest number of miles in the 12 hours of the relay" W6BVY's naturally leads all others by a large margin, due to the fact that it made three complete closed circuits. The mileage covered by this transcon was 19,670. The next five in order of most mileage are as follows: W2BPY, 6830; W7ALM, 6700; W6NK, 6580; W2CSC, 6070; W3HC, 5985. These figures are of interest from the standpoint of seeing how many miles an amateur radiogram can travel in twelve hours. The "average" miles per hop of all transcons starting on 3500 kc. was approximately 611.

Conditions on 3500 kc. during the relay were rather "spotty" in all localities. The transcon started off with a "bang" at 4:00 p.m. in all time zones. Activity was at a peak from 4:00 until about 7:00 or 8:00 p.m., at which time OM Skip started to take his toll. Ninety-nine out of each hundred participants had an encounter with that demon. And with 364 other nights in the year to pick on, "QRN" chose December 12th to make life miserable for transcon enthusiasts. The QRN was "freakishly" bad, being reported in several quarters as being of "summer propensities." Actual "electrical storms" were reported by a few, and K6AJA had to close down to avoid being "extinguished." "Fading" was quite noticeable, joining hands with "Skip" to make his devilry more effective. Other handicaps included "power leaks," all kinds of "QRM," "a.c. current shut-offs" by power companies, and all the other evils. All in all conditions were not the type that assure successful relaying, but as usual the gang came through and showed what could be done in the face of adversities. The tables showing what was accomplished will speak for themselves. We think the results are "OKAY."

ALTERNATE ROUTES

Several of the transcons in both relays traveled on various "side" or "alternate" routes in addition to the main routes shown in the tables. In order to most fully show how each message moved, we are here recording all "alternate routes" on which we have information.

1750 KC.

No. 5XN9: W8BYD intercepted this one from W9CDM and sent it along to W1AFB, where it died due to the late hour.

No. 3LB6: W6AM started this one through W6AHP early in the relay, but noting later that it was making but little progress passed it to W9CDM. W9GAI intercepted it somewhere along the line and relayed to W9CTP, who passed it to W8BGY. W8BGY gave it to W1ANC and received a reply but, due to the closing hour overtaking him, the reply died on his hook. VE3DB intercepted from W9GTT, passed it to W1ANC and received his reply. This intercept route was VE3DB-W1ANC-VE3DB-W9DKH-W9DEX,

Number and Starting Time	Routing (3500 Kc.)	Time	Total Miles	No. of Relays	Miles Per Hop	Miles Per Hour	Rating
Dec. 12th 2QT5 8:33 p.m.	W6BVY-W6AJP-W6AKW-W3CXM-W6AKW-W6AJP-W6BVY-W6AJP-W6AKW-W3CXM-W6AKW-W6AJP-W6BVY-W6AJP-W6AKW-W3CXM	1 hr. 59 mins.	19670	21	937	9912	72894.
6BD7 7:07 p.m.	W6CIS-W6AM-W5VQ-W2AUS-W5VQ-W6AM-W6CIS	16 mins.	5030	6	988	22236	13342.
7BQ4 5:40 p.m.	W6AM-W5VQ-W2AUS-W5VQ-W6AM	16 mins.	5230	4	1308	19608	5230.
8DS3 4:02 p.m.	W6NK-W6AJP-W6AKW-W6AM-W5VQ-W2AUS-W1ANC-W2AUS-W5VQ-W6AM-W6AKW-W6AJP-W6NK (See alt. routes)	4 hrs. 4 mins.	6580	12	548	1614	3883.2
2TS3 7:38 p.m.	W2AUS-W5VQ-W6AM-W5VQ-W2AUS	26 mins.	5230	4	1308	12066	3218.4
1JW9 5:33 p.m.	W6FFU-W6NK-W6AJP-W6AKW-W3CXM-W6AKW-W6AJP-W6NK (died 8:14 p.m. P.S.T.) (See alt. routes)	2 hrs. 41 mins.	5785	7	826	2154	1760.6
6EI5 5:10 p.m.	W2BPY-W3AOO-W8CVS-W8BXJ-W9FAW-W9CTP-W3CXM-W5VQ-W6AM-W5VQ-W3CXM (died 11:47 p.m. E.S.T.) (See alt. routes)	6 hrs. 37 mins.	6830	10	683	1032	1720.4
4VV4 4:30 p.m.	W2CSC-VE3AU-VE3ZZ-W8CUG-W8BYD-W9DKH-W9DJK-W9AFN-W6AM-W9AFN-W2KG-W2CSC-W2KG-W3NK (died 3:52 a.m. E.S.T.) (See alt. routes)	11 hrs. 22 mins.	6070	13	467	534	1504.1
5UU4 4:40 p.m.	W3HC-VE3GT-W8DLG-W9CTP-W9DIT-W9GFL-W9EJQ-W9DGS-W7ALM-W9DGS-W8CVS-W3AOO-W3BBW (died 3:55 a.m. E.S.T.) (See alt. routes)	11 hrs. 15 mins.	5985	12	499	528	1276.8
4SH5 4:10 p.m.	W3BWT-W8DFR-W9CTP-W9DIT-W9GFL-W9EJQ-W9DGS-W7ALM-W9DGS-W8CVS-W3AOO-W3BWT (See alt. routes)	11 hrs. 30 mins.	5565	11	506	480	975.8
4ME5 4:04 p.m.	W1CDX-W1CPT-W2AUS-W5VQ-W6AM-W5VQ-W2AUS-W1ANC-W2AVS (died 10:54 p.m. E.S.T.) (See alt. routes)	6 hrs. 50 mins.	5775	8	722	840	901.4
2IS5 7:13 p.m.	W1ASP-W8DBX-W8BKM-W9FRA-W5BML-W6AM-W5BML-W9FRA-W8FMG-W2BWW (died 3:45 a.m. E.S.T.) (See alt. routes)	8 hrs. 32 mins.	5698	9	633	666	901.4
3CA4 9:34 p.m.	W7ALM-W6AM-W3QV-W6AM-W7ALM	2 hrs. 1 min.	6700	4	1675	3318	885.9
4UV3 4:04 p.m.	W3ATJ-W8FCB-W8BYD-W8EGI-W9CTP-W9FNK-W5BML-W6AM-W5BML-W9FRA-W8FMG (died 3:55 a.m. E.S.T.) (See alt. routes)	11 hrs. 51 mins.	5885	10	589	492	827.7
3TO0 4:30 p.m.	W1IP-W2BIA-VE3DW-VE3CD-W8BKM-W5BML-W6AAN-W5BML-W2AUS (died 12:06 a.m. E.S.T.) (See alt. routes)	7 hrs. 36 mins.	5550	8	694	726	778.9
3XZ8 4:44 p.m.	W2CGD-W8CEO-W8CWK-W8DED-W9DKH-W9ACL-W9BNT-W5EB-W6FAC (died 7:01 p.m. P.S.T.)	5 hrs. 17 mins.	3720	8	465	702	751.
5HB6 5:25 p.m.	W6AHO-W6AKW-W3CXM-W6AKW (died 6:25 p.m. P.S.T.)	1 hr.	4765	3	1588	4765	714.7
4WL7 4:30 p.m.	W4SS-W4AMA-W9COS-W9DMY-W9DGL-W9ACL-W5VQ-W6AM-W5VQ (died)	7 hrs. 51 mins.	4763	8	595	606	647.2
5S14 4:17 p.m.	W3SM-W3BQV-W8AGG-W8CUG-W8BYD-W9DKH-W9COS-W7ACH-W9COS-VE3ZZ (died 2:45 a.m. E.S.T.)	10 hrs. 28 mins.	4735	9	526	450	610.7

Number and Starting Time
2CD6 4:20 p.m.
1ST9 5:40 p.m.
6LB7 4:55 p.m.
5UC8 9:50 p.m.
9EI8 5:22 p.m.
5EE4 5:00 p.m.
8ET6 4:30 p.m.
5LF8 4:45 p.m.
7ZC2 6:12 p.m.
5ET3 9:45 p.m.
2US5 12:45 a.m.
6VG5 5:30 p.m.
6QF9 12:55 p.m.
4HN7 5:00 p.m.
8ZX3 4:33 p.m.
9QE3 5:02 p.m.
4RX7 5:12 p.m.
6LA1 4:53 p.m.
7JW9 77

where
W8BG
W9GA
from V
W1AF
No.
c.w. T
nite in
'phone
route
W9GT

<i>Number and Starting Time</i>	<i>Routing (3500 Kc.)</i>	<i>Time</i>	<i>Total Miles</i>	<i>No. of Relay</i>	<i>Miles Per Hop</i>	<i>Miles Per Hour</i>	<i>Rating</i>
2CD6 4:20 p.m.	W2WP-VE3ZZ-W8CUG-W8BYD-W9DKH-W9COS-W7ACH-W9COS-VE3ZZ (died 2:47 a.m. E.S.T.)	10 hrs. 27 mins.	4955	8	619	474	505.7
1ST9 5:40 p.m.	W3NF-W8ABX-W8QL-W9COS-W7ACH-W9COS-W8QL (died 3:35 a.m. E.S.T.)	9 hrs. 55 mins.	4905	6	817	492	296.7
6LB7 4:55 p.m.	W4AKW-W4NN-W4DW-W9CTP-W8CWK-W9ERU-W6BRV-W6AM (See alt. routes.)	11 hrs. 5 mins.	3985	7	569	354	292.1
5UC8 9:50 p.m.	K6AJA-W6CYX-W6AKW-W9ACL (died 4:00 a.m. C.S.T.) (See alt. routes)	4 hrs. 10 mins.	4290	3	1430	1026	266.2
9E18 5:22 p.m.	W2KG-W8CEO-W8CWK-W8DED-W9COS-W9BRX-W9YA-W4TM-W9GOY-??	11 hrs. 38 mins. (10 h. 8 m.)	2320	8	290	198 (228)	197.8
5EE4 5:00 p.m.	W3AAJ-W3WO-W8CWK-W8DED-W9COS-W9DMY-W9DGL (died 9:00 p.m. C.S.T.)	12 hrs. (5 hrs.)	1508	6	251	126 (302)	47.1
8ET6 4:30 p.m.	W4DW-W4AO-W4AJ-W8BGY-W9CKU (died 12:25 a.m. C.S.T.)	12 hrs. 30 mins. (8 h. 55 m.)	1735	4	434	139 (192)	26.4
5LF8 4:45 p.m.	W4HN-W4IB-W5ANX-W5YH-W6BXV-??	12 hrs. 15 mins. (3 h. 5 m.)	1065	4	266	84 (342)	10.04
7ZC2 6:12 p.m.	W4AMA-W9COS-W9DMY-W9DGL (died 9:00 p.m. C.S.T.)	10 hrs. 48 mins. (3 h. 48 m.)	1253	3	417	114 (325)	9.1
5ET3 9:45 p.m.	W4PW-W4TM-W5AHO (died 8:56 p.m. C.S.T.)	7 hrs. 15 mins. (11 m.)	1215	2	607	162 (6624)	5.4
2US5 12:45 a.m.	W7BAA-W6CEL-??	3 hrs. 15 mins.	740	1	740	224	1.1
6VG5 5:30 p.m.	VE5BR-W7SL-W7ACJ (died 5:45 p.m. P.S.T.) (See alt. routes)	10 hrs. 30 mins. (15 m.)	515	2	257	49 (2058)	.66
6QF9 12:55 a.m.	W6BRV-W6AM (See alt. routes)	3 hrs. 5 mins.	285	1	285	90	.17
4HN7 5:00 p.m.	W6DGL-W6AEK-??	10 hrs.	300	1	300	30	.06
8ZX3 4:33 p.m.	W7KZ-W7YH (died)	11 hrs. 7 mins.	275	1	275	25	.045
9QE3 5:02 p.m.	W7SL-W7ACJ (died)	10 hrs. 58 mins.	250	1	250	22	.037
4RX7 5:12 p.m.	W7ACJ-W7AQK-??	9 hrs. 48 mins.	100	1	100	10	.006
6LA1 4:53 p.m.	W7LD-W7KZ (died, transmitter broke down)	11 hrs. 7 mins.	50	1	50	4	.001
7JW9 ??	W7ANT-??-W7APD-W7SL-W7APD-W7BCI-??	—	—	—	—	—	—

where it died. VE3DB also gave the reply to W8BGY, from where it went to W9CTP to W9GAI, and stopped. W8BYD also intercepted from W9GTT and relayed to both W2CGD and W1AFB, neither of whom started reply.

No. 3GV6 was started on both 'phone and c.w. route is shown in the table. Indefinite information was received relative to the 'phone routing. According to W2FR the 'phone route was W1AOX-W8AJZ-W2FR-W8UP-W9GTT-W9ESL. But according to W9GTT he

received it from W1BCR and continued the route as follows: W9GTT-W9CDM-W6AM-W6CDM-W9GTT-W1BCR. Also, the reply was received from some source at W8CDS and passed along W8UP-W2FR-W1BCR.

No. 7KN2: VE3GT sent this one to VE3DB, but failed to get acknowledgment, so passed it along to W8BYD as is shown in the main route. However, VE3DB got it OK and relayed to W9DKH, from where it went to W9DEX, who had already received it via the main route.

No. 4HS5: W1AFB passed this to two stations, VE3DB as is shown in the table, and also W8CSW. The latter route was W1AFB-W8CSW-W8BYD-W9DEX. W9DEX held it since he had already received it via the main route.

No. 5PE4: W1ADW started through W9BBR as well as to VE3GT. Routing from W9BBR is unknown.

No. 2XV3 was started by W7ALM via both W7EK and W7AVZ. W7EK's routing is unknown. W9BPK received No. 2XV3 from some one and passed to W8BYD, where it arrived after the closing time of the relay.

3500 KC.

No. 8DS3: Although W6NK officially received the reply to No. 8DS3 from W6AJP, he also intercepted from W6AM and W6AKW further along on the route, so that he unofficially received the reply to his message about 2 hours, 25 minutes before he acknowledged it to W6AJP.

No. 1JW9 was intercepted by W6AM while W6AJP was sending it to W6AKW, and started the following route: W6AM-W5VQ-W2AUS-W5VQ-W6AM-W6FFU. Since this was an "intercept" route it cannot officially count in the rating of the message. W6AM also relayed the reply to W6CIS earlier than he passed it direct to W6FFU.

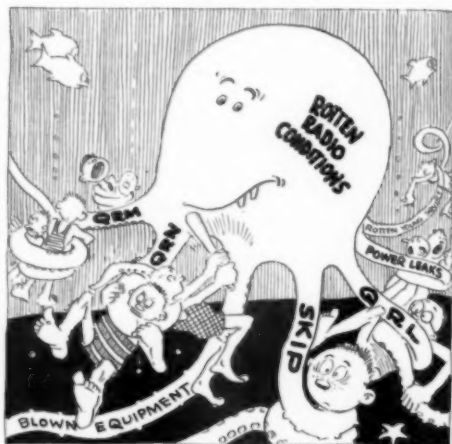
No. 6EI5: W3CXM relayed both to W5VQ and W6AKW, and received a reply direct from W6AKW. The W5VQ route made the best rating. W3AOO, who relayed to W8CVS on the main route, also passed this trancon to VE3ZZ. VE3ZZ, in turn, started two routes, one to W9DKH, where it died, the other to VE3AU to W9YB, from where the routing is unknown. The station of origin of this trancon, W2BPY, also started two routes; the main one through W3AOO and a second through W8CUG to W8DFE, from where routing is not known.

No. 4VV4 did quite some hopping about. W3NK claims to have received the reply from W9AFN earlier than it arrived at W2KG, and to have passed it along to W2BGO. W9AFN evidently relayed to both W3NK and W2CSC. The W2KG routing made the best rating. W2KG called W2CSC on the land 'phone to advise him he had the reply. W2CSC immediately got on the air, took the reply, and started a reply to a reply via W2KG. W2KG passed this to W3NK, who was unable to relay due to the closing time overtaking him. W2CSC started No. 4VV4 through two stations, VE3AU (shown on the main route) and W8BGY, from where it traveled to W9DKH-W9ACL-W9BNT-W5EB-W6FAC. W9ERU intercepted from W5EB and started the side route W9ERU-W6BRV-W9ERU-W3HC. W3HC was unable to relay back to W2CSC.

No. 5UU4: W9BRX got this from some station and relayed by c.w. to W9COS, and by 'phone to W9YA. W9COS started route W9COS-W7ACH-

W9COS-VE3ZZ. VE3ZZ was unable to relay due to skip effects. W9YA relayed to W4TM, W9CXX and W9GXI. The routing from the latter two stations is unknown, but W4TM passed along to W9GOY, whose disposition of the message is unknown.

No. 4SH5 was picked up by W9GAI from an unknown source and traveled W9GAI-W9ACL-W9DMY-W9DGL. W9DGL could not forward due to poor conditions, especially QRN.



THE BATTLE WITH THE OCTOPUS

No. 4ME5: W2AUS relayed this one through two stations, W5VQ and W8DBX. The W5VQ routing was the best. From W8DBX the message traveled VE3GT-W8DLG-W9CTP-W9GAI-?

No. 2IS5 originating at W1ASP arrived at three different west coast stations! Being unable to get VE3GT's acknowledgment that he had received the trancon OK, W1ASP started it through W8DBX, and it traveled the route shown in the table. However, VE3GT did get the message okay and was the second point in the route W1ASP-VE3GT-W8DLG-W9CTP-W9GAI-W9FNK - W9COS - W7ACH - W9COS - VE3ZZ. VE3ZZ could not relay due to skip effects and the late hour. W9FNK did not get W9COS' acknowledgment so he started another route as follows: W9FNK-W9GXV-W9BWF-W9GQT-W6BRV-W6AM-W9ACL-W1AFB. The last two hops were after the closing hour of the relay. W9FNK also relayed to W9HZT, but did not receive acknowledgment.

No. 4UV3: W9CTP started a side route on this one by relaying to both W9FNK and W9GAI. W9GAI passed it to W9FRA, who held it as he had already received the reply via the main route.

No. 3TOO: W2BIA relayed through two stations, VE3DW and W8DLG. VE3DW routing is shown in the main route. W8DLG forwarded to

W9CTP-W9GAI-W9FRA-W9BIK—?? W9CTP started a side route through to W9FNK-W5BML-W6AM-W5BML-W9FRA-W3BWT. W3BWT received the reply at 3:50 a.m. and did not have time to relay to W1IP, the originating station.

No. 6LB7: W6AM relayed the reply to No. 6LB7 to W1AFB after the closing time at W1AFB. W9ACL served as liaison in providing fills for W1AFB and W6AM, who were experiencing difficulties in QSO.

No. 5UC8: K6AJA, Hilo, Hawaii, originated this one. The closing time of the relay found the message at W9ACL. Even though the relay had

the routes are shown here to credit all concerned: No. 70MLAY83: W1HD-W3SM-W8DFR-VE3ZZ-W8CUG-W8DFE—?? No. H311P: W2BDR-W8UV-W8CUG-VE3CP-W8BGY-W9HSW—??; also W2BDR-W3AOO-W8AJU-W9DAF—died.

COMMENTS RE 1750 KC. AND THE TRANSCON

A few notes from participants reports are extremely interesting: W1ANC writes, "Were on the air through the entire 1750-kc. relay except between 6:00 and 7:08 p.m. E.S.T. We logged 72 amateur stations in the band during the contest. These were all in "W" districts 1, 2, 3, 4, 8, 9 and VE3. Of these, 18 were 'phone stations. Best DX heard was W9BPG, Monona, Iowa and W4WB, Macon, Ga., both c.w. Worked both stations and got QSA4 report. Every station we QSOed was in the contest and anxious to QSP. Several of the 'phones used superhet receivers with no provision for c.w. reception and were thus handicapped. I enjoyed the contest very much." W6AM says, "W9CDM was raised at 5:40 p.m., and time to time schedules were maintained with him at intervals of about an hour until the transeon time ended for him in Kansas." W9AIR comments: "Phones were after the transcons with enthusiasm. Our own Dakota Division had at least four 'phones of medium range enter into the relay. Often the messages would require fills due to carrier heterodyne, but the spirit of tolerance manifest on this band, and the number of experienced operators who operate both c.w. and 'phone at will, makes for a splendid interfraternity between the two types of transmission, which are so often needlessly moved to animosity." VE3GT writes: "Took a peek at the other bands during the transeon and none of them were much good for anything. Guess we on 1750 kc. were better off than higher frequency hams, that night at least. I actually made fourteen contacts during the twelve hours, which is not so bad considering that I experienced a three-hour period of electrical interference without a single QSO. For short and medium distances 1750 kc. seems to be the only reliable channel for traffic handling, particularly when the skip takes effect on 7 and 3.5 mc." W1EZ observes: "I am sure that the 1.75-mc. band is one of our best for local, winter communication. Although I heard no west coast stations, the fourth and ninth districts came through with an excellent degree of reliability." From Georgia we receive the opinion of W4AMK: "Reliable QSOs up to 1000 miles are possible on 1750 kc. with very little power. Most amateurs are afraid of the band because they labor under the impression that they must have a Hertz of 240 feet or so. A more erroneous idea never existed. W4AMA and myself have made many tests, both with the Hertz and without it, and his signals are actually louder here when he is using his 3500-kc. antenna in conjunction with a ground than they are when



RIP VAN WINKLE, 1932

officially closed W9ACL wanted to get the transeon to the east coast, and if possible a reply back to Hawaii. The relays that followed were W9ACL-W1AFB-W9ACL-W6AKW-W6CYX. W6CYX was unable to raise K6AJA, since the latter had closed down due to an electrical storm. W9ACL also relayed to W8FMG after the close of the transeon.

No. 6VG5: W7APD and W7SL both report receiving this one from VE5BR on 'phone. W7APD's routing is unknown. W7SL relayed to W7ACJ and to W7AQK. W7ACJ was unable to relay: W7AQK's routing is not known.

No. 6QF9 was filed to start with W6KU. He was, however, unable to clear it, so he took it over to W6BRV, from which station it was started. W6AM relayed to W9ACL after the closing time at the latter. W9ACL passed along to W1AFB, who gave a reply to W9ACL. W9ACL held since the last three jumps really did not count in the relay because they were made after the closing time.

UNOFFICIAL TRANSCONS

Transcons were started by W1HD and W2BDR without official numbers assigned by Headquarters. These cannot be given a rating but

he uses a Hertz." W3CL, Vice-President of the Western Radio Communication Society of Philadelphia says, "The 1750-kc. band has been used by the members of our club for local work during the past four years. The transcon of December 5th and 6th has proven the value of this band. I heard every district including the 6th; both 'phone and c.w.; QSA4-5, R5-9." W7KH ('phone) reports: "The 1750-kc. band has been very much unused out here in the north-west. I am very much enthused over the work that can be done on 160 meters for short and medium distances. Have had a schedule with W7QP, about 325 airline miles, and use 160 meters with 100 watts input, getting in there QSA without a bit of interference."

COMMENTS RE 3500 KC. AND THE TRANSCON

W9CTP writes: "The relay sure was F.B. This transcon has proved that quick and reliable cross-country chains can really be established. A transcon route was maintained through W1AFB, W8DLG, W9CTP, W9ERU, W9FAM and to the west coast. Also, others branched in or through this channel. Half-hour schedules were maintained with the respective stations east and west. And, half hourly word would go along this chain to the east and west coast relative to activity. It sure gave me a big kick!" Difficulties were encountered with "skip" and general QRN. W8CWK joins several others in saying, "I thoroughly enjoyed the relay, and think if such an activity were held more frequently it would help traffic handling methods and stimulate traffic routes." W2AUS sums up the relay as follows: "A total of eighteen transcons were handled here. I never had so much fun in my life and am certainly glad I entered the 3.5-mc. transcon. One thing that probably prevented a number of reply messages from reaching the east coast was the sudden change in conditions around 9:00 p.m. E.S.T. Skip set in and it was just possible to read W1ANC (a distance of 100 miles) at 8:25 p.m. When I retired from the field of action at 2:10 a.m. due to fatigue, static and lack of east-bound messages, all signals were weak, and the QRN increased to a terrific strength; a number of 9's were heard calling 'CQ West,' so apparently there were a great number of messages that never even got to the coast. During the period from 4:00 p.m. to 7:00 p.m. the QRM was terrific. 'Thousands' of CQs were heard, mostly West, and those wanting to take transcon messages; nobody seemed to have any, and the confusion was great. Those who did have them couldn't raise anyone, because every one was listening to every one else." The report from W5VQ reads: "This transcon from my point of view was a decided success. Contact with W2AUS was established at 6:00 p.m. C.S.T. and continued at intervals of fifteen minutes until 12 midnight, QRN making it necessary to QRT at that time.

Shortly after the first message was received via W2AUS, W6AM was heard calling me, and from 6:30 until midnight constant contacts were kept with him." W6AM says, "Handled 46 messages in all; 24 transcons sent, 22 received. During the contest W6AM worked two east coast stations, traffic being handled direct with one. W3QV. Most hams were complaining of bad conditions so I handled lots of east bound as well as west bound messages." From W9YA ('phone): "We do not believe that a more unfavorable night for transcontinental work could have been chosen. The only stations that came through with any volume at all were those within a five-hundred-mile radius, and they faded badly and were weak. But we had a good deal of fun and experience in working this relay." W5AHO ('phone) found conditions poor. He says, "The QRM and static were very bad as our weather was rapidly changing and this QRM and QRN made it impossible for me to hear anything but locals and high-powered stations. I sat up until nearly the time the relay was to close, but did not hear a single western station. I noticed that other 'phone stations could not get further west than this state, and would like to say that weather conditions were very bad for this contest in Oklahoma." VE3GT reports, "Conditions were excellent until about 10:00 p.m. when the QRN became like midsummer, and the old skip skipped away. I was on all but two hours, and couldn't raise a thing coming east." From the northwest W7ACJ ('phone) writes: "Didn't receive any east coast messages. None heard here. Skip was very bad and we could not get east at all. We could hear several 4's, 8's and 9's pounding in here, but none having west-bound traffic. W4TM was most consistent station heard by northwest listeners." VE5BR tells how he found conditions: "Was on the air sharp at 4:00 p.m., but was unable to raise any c.w. stations, so at 5:00 p.m. tried 'phone. Within fifteen minutes raised four stations and at 5:30 relayed my message to W7APD. The 'phone gang got organized in fine style early in the evening. W7SL was doing fine work in lining up all the northwestern stations to stand by and clear the air for the transcons. As soon as I cleared the 'phone message I went back to c.w. and tried to clear that one. I was on the air continuously from 5:30 until 1:00 trying to raise any c.w. station, but failed dismally, and reluctantly had to give up. The QRM was terrible from west coast stations calling CQ. Every one seemed to have a message going east that they couldn't get rid of. A few eastern stations could be heard occasionally through the bedlam, but it was impossible to raise them." In spite of the fact that VE3DW had 19 pre-arranged schedules he handled only one message. He says, "Conditions became very poor from 10:00 p.m. to midnight. Then a few W6's and W7's were heard. QRN

(Continued on page 28)

Simplified Remote Control for Amateur Transmitters

By Henry T. Hayden, Jr., W2FO*

WHAT a problem! In these hectic days of crowded apartment house life it is next to impossible for a fellow to find room for his pet diversions. There is photographic material, fishing tackle, all the sport outfits and so many other articles that when a radio transmitter is mentioned there arises so much objection and criticism from all sides that the matter often is dropped without further discussion.

A transmitting key and a short-wave receiver require so little room that no objections to them are raised; but reveal your intention of erecting a transmitting station and mother, father, or wife have visions of loops of black unsightly wires, insulators, coils, hot sparks and what not. Try as you may, it is difficult to transplant your view of it into their minds. Then there is the younger brother or son who delights in tinkering with apparatus that holds so much bewilderment, and without destructive intent but through curiosity gets everything all out of "whack."

The experience is so common to most of us that it seems like repetition to discuss it. What we should do, naturally, in a case of this kind is to find out how some other ham got around it and avoid further argument—which may create

rate the interior with all that "impossible apparatus." The answer is remote control.

LOCATING THE TRANSMITTER

The best location for the transmitter of the apartment house station is in a watertight box mounted on the roof of the building. The box is a simple thing for any amateur to make and a good lock will suffice to keep the apparatus intact. Here the antenna locations are easily



THE REMOTE-CONTROL RELAY

found, and once adjusted the transmitter may be left for weeks without further attention. The lead-in for such an installation includes two 110-volt 60-cycle power supply wires and two or three low-voltage relay leads which may be cabled together and dropped over the side of the building and run to the operating position. Those who are fortunate enough to have an attic have a more ideal location for the transmitter because of its convenience for frequent inspection.

Formerly, relays were too expensive for the amateur to think of building a remotely-controlled station. The design was also unsuitable in that the relays were of large capacity and somewhat bulky for amateur use. Contacts were a further source of trouble because of the kind of metals selected for these parts. Now, since amateurs have become so numerous and created a market, it is possible for the manufacturer to build a small relay designed particularly for the amateur's needs at a cost within his reach.

Two midjet relays recently placed on the market are illustrated in the photographs. One shows a view of the remote control relay, which is

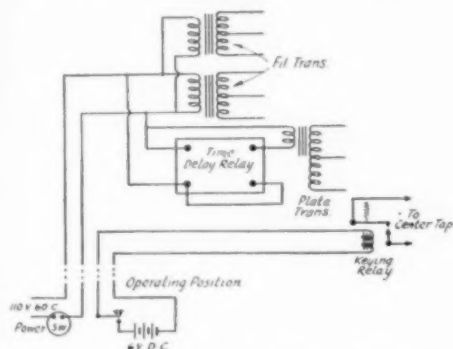


FIG. 1.—A REMOTE CONTROL CIRCUIT USING TWO RELAYS

The time-delay relay turns on the plate power after the rectifier and transmitting tube filaments have reached operating temperature. The second relay is for keying.

more opposition and make the situation more difficult. But there is a way around it, whether you are an apartment house dweller or have a suitable room but haven't the permission to deco-

* Ward Leonard Electric Co., Mt. Vernon, New York.

obtainable in single or double pole and single or double throw, and the other the midjet time-delay relay used for mercury-vapor rectifier tubes. Manufacturers of these tubes recommend the



AN AMATEUR TYPE TIME-DELAY RELAY WITH CASE REMOVED

use of such a device to delay the application of plate voltage until approximately 15 seconds after the filament voltage is applied.

The diagram, Fig. 1, shows a typical layout for a remote transmitter and the locations of relays in the circuit to accomplish the control.

Sometimes, when operating a multi-tube transmitter, it is desirable to open the oscillator plate circuit while receiving. This may be done by using an auxiliary relay operated from a bell-ringing transformer or filament transformer and connected with contacts in series with the oscillator plate supply.

With a little thought and care in the plan and arrangement of a remotely controlled transmitter, in almost every instance, the problem of insufficient room can be solved by the removal of the objectional apparatus to a safe and obscure location.

The December Transcons

(Continued from page 26)

increased and later I heard a W6 giving a message to a W9, but could not get in on it. That was the only one coming east heard here. It was very exciting to hear them going west. Even at 3:30 a.m. there were W9's battling to scale the Rockies. Mrs. VE3DW assisted greatly in that she pounded while I rested."

Strays

864 NOW AVAILABLE FROM RADIO DEALERS

Dealers handling RCA and Cunningham tubes can now furnish the Type 864 tube, which formerly was sold only by the RCA-Victor Company direct to purchaser. The 864 is a non-microphonic general-purpose tube, especially applicable as detector, amplifier or oscillator in battery-operated equipment which may be subject to

impact or continuous vibration. Its ratings and characteristics are as follows:

Filament Voltage	1.1 volts d.c.
Filament Current	0.25 amp.
Plate Voltage	135 volts max.
Grid Voltage	-9 volts
Plate Current	2.9 ma.
Amplification Factor	8.2
Plate Resistance	13,500 ohms
Mutual Conductance	610 micromhos
Approximate Direct Interelectrode Capacitances:	
Plate to Grid	2.3 μ fd.
Grid to Filament	5.4 "
Plate to Filament	3.5 "

It's a good idea to allow for stretching when a new antenna is put up. W3AAJ took his old one down recently and found it was almost two feet longer than it was when he put it up!

Information Service Rules

PPROMPT handling of inquiries concerning amateur equipment and problems will be greatly facilitated if the following rules are observed when writing to the A.R.R.L. Technical Information Service:

1. Before writing, consult *The Radio Amateur's Handbook* and your files of *QST*. Nine times out of ten you will be able to find the answer in *QST* or the Handbook.
 2. If reference is made to the Handbook, mention the page and the edition to which you refer. If reference is made to *QST* mention the page and issue you have in mind.
 3. Write on one side of the paper only, and use a typewriter if possible.
 4. Number the questions and make a separate paragraph for each question. Make the questions as brief and as direct as possible.
 5. Make diagrams on separate sheets of paper and fasten them to your letter with a pin or paper clip. All diagrams should be schematic—do not send pictorial diagrams.
 6. Print your name and address in full on each sheet of paper. A return address on the envelope is not sufficient, as the envelope is destroyed by the office manager as soon as the letter is opened.
 7. Keep an exact copy of your questions and diagrams, and mention that you have done so.
 8. Do not ask for opinions on, or comparisons of, business concerns or their products.
 9. Enclose postage for the reply but do not send an envelope. It is much more convenient for us to use our own envelopes with our stationery.
 10. Address all questions to the Technical Information Service, American Radio Relay League, 38 La Salle Road, West Hartford, Conn.
- Any back copies of *QST* to which we refer you may be obtained from our Circulation Department for twenty-five cents each.
- The observance of the above rules will be mutually beneficial.

M
mission
uncert
operat
sible u
provis
It is
classes
tests a

(1)

(2)

(3)

The fo

(1)

and be
possess
ulation
of the
1st, wh

"

used
nor
tion,

Ther
the lav
article
wherei

"

stat
miss
any
as n
is di
char
to th
lang

(2)

its terr
Traffic
of the
the Do

* 1010

April,

Some Notes on Message Handling

Situation Unchanged by Recent F.R.C. Regulations

By Paul M. Segal, General Counsel, A.R.R.L.*

MY correspondence in the way of inquiries from amateurs indicates that the recent enactment by the Federal Radio Commission of its Rules and Regulations has caused uncertainty in the minds of some amateur station operators as to the type of message traffic permissible under those regulations and other applicable provisions of the law.

It is important to note that there are three classes of traffic to which the amateur must apply tests as to their content:

- (1) Traffic between points in the United States and between the United States and its territories and possessions;
- (2) Traffic between the United States (including its territories and possessions) and Canada; and
- (3) Traffic between the United States (including its territories and possessions) and foreign countries other than Canada.

The following standards apply:

(1) *Traffic between points in the United States and between the United States and its territories and possessions.* — The Commission's applicable regulation in this regard is found in paragraph 373 of the Rules and Regulations, effective February 1st, which provides:

"373. Amateur radio stations shall not be used to transmit or receive messages for hire, nor for communication for material compensation, direct or indirect, paid or promised."

There is nothing in this regulation which alters the law and it still remains as I indicated in my article on pages 13 to 18 of *QST* for July 1928, wherein I said:

"An amateur operator, at an amateur radio station, may, under the law, accept for transmission, transmit, relay or deliver a message of any kind of text, importance or source so long as no money or other valuable consideration is directly or indirectly paid or promised him or charged or accepted by him, subject of course to the general laws against obscene or profane language over the air."

(2) *Traffic between the United States (including its territories and possessions) and Canada.* — Traffic with Canada is governed by the provisions of the notes exchanged between the Minister of the Dominion of Canada and our Department of

State, dated October 2, 1928, December 29, 1928, and January 12, 1929, providing that Canadian amateur stations and United States amateur stations may exchange the following types of messages:

"1. Messages that would not normally be sent by any existing means of electrical communication and on which no tolls must be charged.

"2. Messages from other radio stations in isolated points not connected by any regular means of electrical communication; such messages to be handed to the local office of the telegraph company by the amateur receiving station for transmission to final destination, e.g., messages from expeditions in remote points such as the Arctic, etc.

"3. Messages handled by amateur stations in cases of emergency, e.g., floods, etc., where the regular electrical communication systems become interrupted, such messages to be handed to the nearest point on the established commercial telegraph system remaining in operation."

The above understanding is reciprocal and is interpreted to mean that tolls are not to be accepted and that amateurs will not compete with commercial radio stations or telegraph lines.

(3) *Traffic between the United States (including its territories and possessions) and foreign countries other than Canada.* — This is governed by the provisions of the following language from Article 6 of the Regulations attached to the International Radiotelegraph Convention of 1927:

"The exchange of communications between private experimental stations of different countries shall be forbidden if the Administration of one of the interested countries has given notice of its opposition to this exchange.

"When this exchange is permitted the communications must, unless the interested countries have entered into other agreements among themselves, be carried on in plain language and be limited to messages bearing upon the experiments and to remarks of a private nature for which, by reason of their unimportance, recourse to the public telegraph service might not be warranted."

I know of no country which has given notice of its opposition to the exchange of communication under the first-quoted paragraph.

*1010 Shoreham Bldg., Washington, D. C.

The Old "Peaked Audio" Receiver Rebuilt

Modifying the 1929 Four-Tube Set for A.C. Operation

By Amos Doolittle

MANY of my ham friends having built the "peaked" four-tube set back in 1929, and all of them having had success with it, I am led to think that perhaps there are still lots of amateurs who would welcome information on how to convert the receiver for a.c. operation.

My own set has given consistent service since it was built, and though I realized that I should have an a.c. operated set, I was by no means prepared to ditch the old receiver and start all over again. The first work was a replacement of the UX tube sockets with a five-pin type and a re-wiring of the filament and cathode circuits in accordance with normal practice. First tests showed a surprising improvement in general "sock" compared to that obtained with the d.c. tubes, but revealed an aggravating tendency toward audio-frequency howling. In the attempt to do away with this fault, several different audio transformers were tried between the detector and first audio tubes without success. Attention was then directed to the "Aero-Peak" coupling device in the plate circuit of the first audio tube.

A resistor across this unit eliminated the howling tendency, but severely reduced the peak. Replacement of the Aero unit with the Ford coil and condenser combination failed to give the necessary improvement as did a variety of large by-pass condensers in the audio circuits.

In all these tests it was apparent that the receiver with a.c. tubes provided signal strengths far too great for normal headphone reception, and very early in the work I had decided that any cure for the howling would serve a doubly useful purpose if it cut the gain to some extent. This line of thought led me to consider resistance coupling from the detector to the first audio. It was promptly tried and as promptly found to be a complete cure for the audio instability. The gain was reduced slightly, but the receiver was still capable of putting lots of red meat into the signals that came along.

By this time, of course, the original beauty of the receiver had been considerably marred by such frequent placement and displacement of wires and components. The set was, therefore, again given an overhaul, the two variable resistors being replaced with new (the originals were worn out) and the wiring being treated to a severe clean-up. The final circuit is that given in Fig. 1. Its chief differences from the old original circuit lie in the use of a choke for the input coupling, a resistor for the detector-audio coupling and in the use of biasing resistors in the various cathode leads. One other important change — though not to be seen in the circuit — is in the tickler coil windings. The original ticklers proved to be far too big for the screen-grid detector. About one-third of the turns were removed from each tickler before oscillation was restricted to reasonably high values of screen-grid voltage.

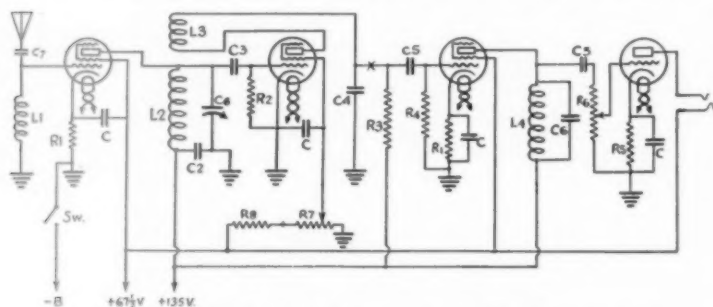


FIG. 1 — CIRCUIT OF THE MODIFIED FOUR-TUBE RECEIVER

Apparatus other than that marked "new" is taken from the old set.

- C₁—1 μ fd. by-pass condensers (one new).
 - C₂— $.004 \mu$ fd. fixed condenser, mica dielectric.
 - C₃—100 μ fd. grid condenser.
 - C₄— $.002 \mu$ fd. fixed condenser.
 - C₅— $.006 \mu$ fd. fixed condensers (one new).
 - C₆—Tuning condenser for "peaked" coupling unit.
 - C₇—Usual antenna series condenser, useful for long antennas.
 - C₈—Normal tuning condenser.
 - R₁—500 ohm resistors, 1 watt (new).
 - R₂—6 megohm gridleak.
 - R₃—100,000 ohm resistor, 1 watt (new).
 - R₄—250,000 ohm gridleak (new).
 - R₅—2000 ohm resistor, 1 watt (new).
 - R₆—200,000 ohm potentiometer for volume control.
 - R₇—50,000 ohm regeneration control potentiometer.
 - R₈—50,000 ohm fixed dropping resistor (new).
 - L₁—About 180 turns of No. 30 or 34 wire on $\frac{1}{8}$ " former. Experiment desirable to determine best size for a given antenna.
 - L₂, L₃—Old coils with some turns removed from the L₁'s.
- The first three tubes are Type '35, the last tube a Type '27.
An r.f.c. may be found helpful at point "x".

It is hardly necessary to go into greater detail than this, since anyone familiar with the old set will find the whole story in the list of components under Fig. 1. It will be noticed that a few extra

plied in much the same way, using a special flux. Somewhat more heat is required than in normal soldering, although the usual soldering iron will work if the area of the pieces being joined is small. For large pieces, such as corner joints in aluminum cabinets, the work should be held over a gas flame to supply the necessary heat, the soldering iron being used to do the actual soldering, however. Joints made with Alumaweld have very high tensile strength.

Alumaweld is manufactured by the Allied Research Laboratories, Inc., Glendale, California.

H.A.R.T.S. DX Contest

April 1 (0000 Greenwich) to April 7
(2400 Greenwich)

THE Hongkong Amateur Radio Transmitting Society invites A.R.R.L. members to freely compete in its first International Contest for the "DX" Trophy Cup, which will be awarded to the foreign amateur who makes the highest score in contacts with VS6 in accordance with the contest rules.

Each VS6 station worked counts one basic point. This can be multiplied by the number of amateur frequency bands on which communication is effected, and again by a special multiple. Some special multiples are as follows: Philippines-3, W6-5, W7-6, W1 W2 W3 and Hawaii-7, Canada. Alaska W4 W5 W8 and W9 — 8.

Stations in this continent taking part must report by mail to H.A.R.T.S., P. O. Box 651, Hongkong, China, and such reports must be mailed within four days of the close of the contest. Reports should include date and time of reception of test message, frequency used, call of station worked and the signal report which was given. Out-of-band stations will be disqualified.

Don't miss this opportunity to contact Asia. Get the missing card toward W.A.C.; perhaps win the DX Trophy.

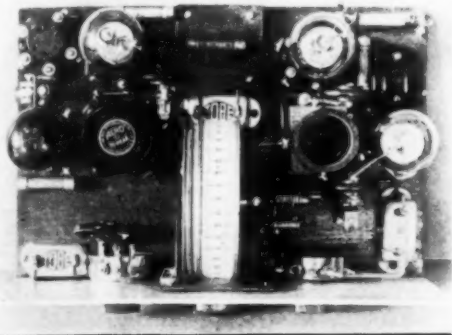
— F. E. H.

Strays

"Radio Noises and Their Cure" is the title of a treatise on interference created by electrical apparatus and appliances and methods of interference elimination. The treatment includes practically all the common types of machines that generate radio interference, such as oil burners, motors, X-ray machines, etc. The book may be obtained from the Tobe Deutschmann Corp., Canton, Mass., for fifty cents.

D'yuh ever hear the one about the sweet young thing who, after visiting a ham station, wondered at what time and over what station the Amateur Bands were presented so she might tune in?

— W5AVK



THE MODIFIED SET

condensers and resistors are needed and that almost all the wiring has been changed. However, the modifications are well worth while to anyone who has one of the original sets and hankers (as I did) for a new one.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

Bernard Edelheit, W6FCQ, Duarte, Cal.
W. A. Hammond, W6ALX, Oakland, Cal.
A. J. Henry, Minneapolis, Minn.
Lieut. T. M. Hughes, W8BXA, Oneida, N. Y.
Dr. W. D. Reynolds, Denver, Colo.
Donald C. Schall, W8JZ, Detroit, Mich.

A New Aluminum Solder

ONE of the few disadvantages of aluminum for radio work has been the difficulty of making low-resistance joints between pieces. The surface of the aluminum eventually oxidizes, leading to higher surface resistance and frequently resulting in a noisy receiver. Ordinary solder will not touch aluminum, so the introduction of a successful solder for this universally-used metal will be of interest to the amateur world.

"Alumaweld" is the name of such a solder, and, according to the manufacturers, it works equally well on iron and steel. The joint formed by it takes on more the nature of a weld than a surface joint, hence the name. It resembles ordinary stick solder in appearance, and is ap-

Here's How—

A True Story Every Ham Should Read

Recalled by W8UC-W4CA

THE other eve during a good chew with an EAR, who should darken my doorway but the '10 from around the corner. Down in my other chair he plops and begins his terrible tale of woe. After a hurried "Sure WL QSL SK" I got in on the finish of, "— and imagine, I only had 1100 a.c. on the plate of the ten at the time." All I could offer was a carton decked in black crêpe with the suggestion to let the dumb bury the dead.

Silver silence followed my attempt to jeer, and friend Usta-Was-'10 asks real plaintive-like, "Well, then *you* tell me how in heck I'm going to get another tube." After minutes of hunting for another butt and a light was secured from the feeders, I brushed back the veil of time and through the haze of smoke and the past I suddenly recalled having heard a solution to this very problem. Then followed the tale of the brass-pounding nine I used to know.

"Once upon a time —"

"Yeah? A fairy tale," my visitor broke in with. I continued. "There was a kid, we'll call him Willie, just like yourself trying to find a way of owning a tube — now he *was* in a pickle. He had the money, but the OW wouldn't let him spend it. Willie took nil for an answer, that is, after the customary nagging, begging and just as customary refusal — no siree, that cash was going to stay banked. So the brasspounder being properly squelched went back into the shack figuring that he could listen in anyway. After five minutes of combing the bands a familiar signal was heard asking another local what had happened to Willie — he had been off his skeds for two days now. Crash went the 'cans'; it was settled — a tube just had to be in that transmitter. If the family hadn't been determined that any extra cash Willie earned would follow the first — in the bank — the problem could have been solved by a few extra errands or more papers to peddle. As you can imagine, the problem was huge, but determination was greater. An OT in town was visited and ideas began to formulate, and after ham Willie left OT's house the tube was as good as in the socket.

"Being out a bit later a few evenings and daily visits to OT (who was treasurer for the fund which accumulated by dint of Willie's spare moments) were all that outwardly seemed different to the strict parents, but nothing alarming seemed about to happen.

"The scene changed to Xmas morning — the family was all a twitter in Willie's home — not to

mention how Willie felt at what was about to happen. After the usual line of socks, ties and dogadgets had been distributed, OW turned to the father of the household with something to the effect that she had something she was proud of and it read thus:

"Dear Friends:

I am writing at this time to express my interest in your son's activity in the wireless work. I have watched his progress unbeknown to him or you, and I am very gratified at his results. He is a lad of whom you should be proud.

I am enclosing twenty dollars which I desire your son to spend in further advancing his wireless work. Will you please see that he spends this money on nothing but wireless apparatus of the latest design?

I shall watch Junior's progress with interest,
Yours,

A. FRIEND.

"Willie tried to look properly astonished and then came out with, 'Well, it looks as though I would have that 202 now.' All agreed that nothing more on their part would stop him, and added that in the future they would look on 'sonny's' wants with a more open disposition."

At the end of this story I looked up to notice what caused a banging and clattering outside.



Apparently my visitor had been satisfied that there was the answer to his prayers, for his wave from the corner and speed of departure could mean nothing else.

But, future perusers of this idea, BEWARE — a month later the air was cluttered with what sounded more like a "fifty" than a "fiver" — and I, being just around the corner, took his punishment!

The Economical Design of Smoothing Filters

By F. S. Dellenbaugh, Jr., and R. S. Quimby*

The articles by Dr. Dellenbaugh and Mr. Quimby in the February and March issues of QST have emphasized the importance of the first choke of the high-voltage rectifier-filter system with respect to both regulation and smoothing, and have clarified as well as simplified the design of the front end of this generally little-considered item of amateur transmitting equipment. In this, the third article of the series, the smoothing action of the filter system is hauled out and given particular treatment. In line with the trend of the times, it is shown how better smoothing for less money can be realized by intelligent coordination of the numerous factors involved. Absolutely practical, this article deserves better than casual reading. — EDITOR.

THE ripple to be expected at the terminals of a smoothing filter employed with r.a.c. power supply may be calculated with a very fair degree of accuracy. While this article is based upon mathematical analysis, the results are presented in tabular and graphical form. Reduction of fundamental design formulas to extremely simple expressions allows the general characteristics of filter circuits to be discussed without trial and error methods, and leads to proper design for maximum smoothing effect with minimum material.

One of the first things is to define what is meant by ripple. Van Der Bijl considers the terminal ripple as the total change in voltage from maximum to minimum. Other writers have considered the ripple as a superimposed wave on the average or d.c. value of voltage, and speak of ripple as the amplitude of this superimposed wave. In the present case a similar consideration is used, but the values of ripple are expressed as the r.m.s. or effective values of the ripple voltage. This is more closely in accordance with general engineering practice. It is warranted since the final ripple is practically a sine wave with any smoothing satisfactory in use. Under these conditions the amplitude of the ripple will be 1.41 times the effective value used in this paper, and the total variation will be twice the amplitude. Therefore conversion from one to the other is simple, the only confusion being to find out which definition any particular author is using.

A warning against undue saturation in iron-cored chokes is always in order. Unfortunate confusion exists between ratings, actual performance and opinion. The measurement of inductance under actual conditions is difficult without a specially equipped laboratory. All of the inductance values mentioned herein are actual values tested by special bridge or other methods under conditions very closely duplicating those found in operation. For good smoothing any approach to resonance must be avoided. This holds for both 60 and 120 cycles. With a balanced single-phase full-wave 60-cycle rectifier, 120 cycles is the

lowest frequency to be expected in the output. However, a 60-cycle resonance in the filter may produce oscillations which will unbalance the tubes and cause various disturbances varying from too great a ripple to violent oscillation. This is too complicated to be treated in this article and deserves detailed treatment separately. The general warning is that if the r.a.c. power supply appears erratic, look for resonance in the first section and cure it by increasing the size of the first choke or the first condenser.

Fig. 1 shows the two filter elements separated, the arrows indicate the circuits that become resonant. In the first section simple series resonance is found. In the second section resonance around the circuit (circuital resonance) must be considered. The same formulas hold for both, except that in the case of Fig. 1b the value of the two condensers in series must be used. The formulas are as follows:

$$f = \frac{1}{2\pi\sqrt{LC}} \text{ or } 1 - \omega^2 LC = 0$$

where f = frequency in cycles per second, L = inductance in henrys, C = capacity in farads, $\pi = 3.1416$ and $\omega = 2\pi f$.

For 60 cycles $\omega^2 = 0.142 \times 10^6$

" 120 " $\omega^2 = 0.570 \times 10^6$

$C_1 \text{ \& } C_2 \text{ in series} = C_1 C_2 / (C_1 + C_2)$

TABLE I
INDUCTANCE REQUIRED TO RESONATE UNDER GIVEN CONDITIONS

		60 Cycles	120 Cycles
Fig. 1a	$C = 2\mu\text{fd.}$	3.55	0.88 henrys
Fig. 1b	$C_1 = 2\mu\text{fd.}$		
	$C_2 = 2\mu\text{fd.}$	7.0	1.8
Fig. 1b	$C_1 = 2\mu\text{fd.}$		
	$C_2 = 4\mu\text{fd.}$	5.3	1.3
Fig. 1b	$C_1 = 2\mu\text{fd.}$		
	$C_2 = 6\mu\text{fd.}$	4.7	1.2

Thus, with values of chokes in common use there is little danger of approaching resonance in the second filter section, but there may be very grave danger of getting into trouble with the first filter section. A generally unappreciated difficulty lies in the fact that the inductance is not

*President & Engineer, respectively, Delta Mfg. Co., Cambridge, Mass.

constant over the variations of current during each cycle, but has a cyclic value itself due to changes in iron permeability with changing magnetic flux. If any part of the cyclic value falls into the resonant class, instability results, and os-

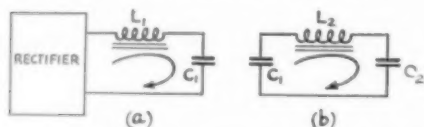


FIG. 1—RESONANT CIRCUITS IN SMOOTHING FILTER

(a) First section, series resonance. (b) Second and succeeding sections, circuitual resonance.

cillographic studies indicate that the cyclic inductance may reach a point as low as 50% of the average value determined by bridge or meter measurements.

The next important item is to define what is meant by "good smoothing." With receiving sets a ripple of 0.01% of plate voltage is inaudible, 0.1% is excellent commercial practice, while 1.0% is bearable, although considerable hum is heard when no signal is being received. As the ripple modulation in the transmitted wave would provide the same relative audibility, these figures probably are approximate measures of satisfaction in transmission as well. Therefore for 'phone transmission we would like to get down to about 1-volt ripple per 1000 volts on the plate, and for telegraphy to 10 volts ripple per 1000 on the plate would probably be satisfactory. These values appear to check roughly with expected smoothing of characteristic circuits as described by various amateurs.

TEST CIRCUIT

The schematic layout of the test circuit used is shown in Fig. 2. The rectifier was the standard '66 type, with the first choke of the swinging variety,¹ having an inductance of 12 henrys under test conditions. The balance of the filter had numerous chokes and condensers arranged so that various sizes and various numbers of sections could be obtained rapidly by test clip connections. The output was fed into a resistance and the a.c. drop across the resistance was measured by a vacuum-tube voltmeter similar to many that have been described in these pages. The method of determining ripple was by deflection and comparison. After the vacuum tube voltmeter measurement was made on the filter circuit, the switch shown in Fig. 2 was thrown over and the required 60-cycle a.c. to give the same deflection was

¹ Cf. McLaughlin and Lamb, "What Is This Thing Called Decibel?" QST, August, 1931. — EDITOR.

measured by meter and drop wire. This method admittedly is open to some criticism from the standpoint of accuracy and frequency segregation, but serves admirably for a rapid relative method of comparison. It thus meets the present requirements and eliminates errors in calibration of a more elaborate voltmeter. The transformer voltage and load current were maintained the same throughout the tests. The terminal voltage was substantially the same, the only variation being due to changes in choke resistance. Only one set of test voltages and current were used, since the variables are already quite complicated, and there is nothing in the results, either theoretical or practical, that would be changed materially by different power conditions.

TABLE II
FIXED TEST CONDITIONS

Transformer voltage, 2100 volts total (1050 volts per side, r. m. s.).
Terminal voltage, 800 to 860 volts d.c. (depending upon choke resistance).
Load current, 300 milliamperes d.c.
First choke (L), 12 henrys.
Balance of filter circuit adjusted as given in each test.
Load resistance, 2700 to 2900 ohms.

FILTER BEHAVIOR

The voltage delivered by the rectifier to the filter is almost exactly a "folded" sine wave, provided that the first choke is greater than the critical value. The filter elements then smooth out this wave, attenuating the variations to any desired degree, and finally deliver a slightly fluctuating voltage to the load. This is shown graphically in Fig. 3. According to the definitions above, the output is assumed to be a uniform d.c. voltage with a superimposed sine-wave ripple, the measured values being the r.m.s. value of this ripple. The original sine wave from the transformer consists practically of the fundamental frequency only, harmonics usually being absent. When this wave is "folded" by the rectifier, however, it becomes unsymmetrical, and contains a great many harmonics. An analysis shows that 43%

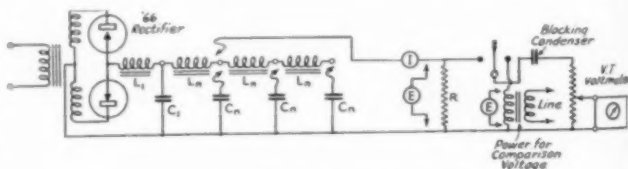


FIG. 2—GENERAL TEST SET-UP
Adjustable filter circuit and vacuum-tube voltmeter.

of the original branch transformer voltage appears as fundamental in the "folded" sine wave applied to the filter. Since this type of filter has much greater attenuation for higher frequencies, it is this fundamental component which con-

tribut
proble
all oth
The
consid
1.
f
2. T
t
n
3. T
o
a
in
Natu
sult if
useful
difficul
match
The se
of wha
for ind
difficul
the mo
smooth
but in
which
operati
plified
tions.
Cons
condition
energy
field an
associated
ers stor
electros
is assoc
given by
Inducta
Capacit
Resistan
or,
secc
Where
L = in
fara
in a
Induc
sidered
usually
tery vol
watt-hou
are paid
and so a
To get a

tributes about 99% of the final ripple, and the problem is thus simplified by being able to neglect all other harmonics.

The filter action in smoothing ripple may be considered from three points of view:

1. The "telephone" method of considering its properties of selective attenuation at different frequencies.
2. The energy-storage method, considering the storage capacity of the different elements.
3. The impedance method, considering the over-all impedance of the load plus the filter and the resulting current variations for any impressed voltage wave.

Naturally all three methods give the same result if properly carried out. The first is chiefly useful for considering the pass band and is a little difficult to interpret if the terminal loads do not match the characteristic impedance of the filter. The second gives a very good physical conception of what is happening and is the simplest to use for indicating general characteristics, but more difficult for predetermining ripple. The third is the most complete and direct for smoothing filter computation, but introduces mathematics which somewhat obscure the operating significance until simplified by successive approximations.

Consider the *energy storage conditions*. Inductances store energy in the form of a magnetic field and their energy is thus associated with current. Condensers store energy in the form of electrostatic field, or charge, and thus their energy is associated with voltage. The actual energy is given by the following expressions:

$$\text{Inductance: Energy} = \frac{LI^2}{2} \text{ watt-seconds (joules).}$$

$$\text{Capacity: Energy} = \frac{CV^2}{2} \text{ watt-seconds (joules).}$$

$$\text{Resistance: Energy dissipation} = I^2R \text{ watts or, to match storage form, } = I^2R \times t \text{ watt-seconds.}$$

Where

L = inductance in henrys, C = capacity in farads, V = potential in volts, I = current in amperes, t = time in seconds.

Inductance or capacity therefore can be considered much in the light of a storage battery, usually rated in ampere-hours; but since the battery voltage is substantially constant, this is also watt-hours. (This is the same unit by which bills are paid to the electric illuminating companies, and so should not be unfamiliar to most of us.) To get an idea of the size and energy involved,

consider a 20-henry choke. Suppose it is operating at 1000 volts and a current of 316 ma.; these values are convenient since the square of 316 ma. is 0.1 squared amperes, and the square of 1000 volts is 10^6 which cancels the 10^{-6} in the conversion from farads to μfd . This choke will thus store

$$\frac{LI^2}{2} = 20 \times 0.1 \times 0.5 = 1.0 \text{ watt second.}$$

This is about the size of choke usually used in the second part of the filter circuit. It will weigh about 20 pounds and, if the energy could be properly applied, it would light a 2-watt lamp for a half second. This does not seem like very much energy and offhand one would not expect such small energy storage to do much smoothing. The cause of its utility for this purpose lies in the very short time between cycles. With full-wave 60-cycle rectification the choke is called upon to fill in a valley of only $1/120$ second. Then the watts delivered, if assumed uniform, would be $1.0 \times 120 = 120$. This sounds more like something useful. The watts dissipated in the resistance load will be: volts \times amperes = 316 watts. So the energy furnished by the choke is a very appreciable part

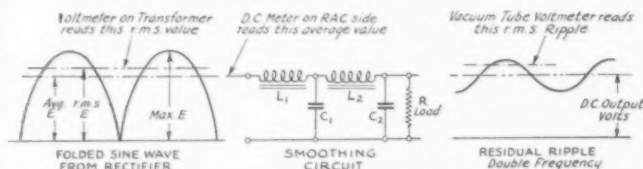


FIG. 3—GRAPHICAL REPRESENTATION OF FOLDED SINE WAVE SMOOTHED BY FILTER CIRCUIT

Full-wave single-phase operation with 2 Type '66 tubes r. m. s. volts = 0.707 max. volts; ave. volts = 0.636 max. volts; r. m. s. volts = 1.11 ave. volts.

of the total energy required. If we associate with the choke a condenser of $2 \mu\text{fd}$., this will also store 1 watt-second at 1000 volts; and with such a condenser at each end of the choke there results a total energy storage of 360 watts, just about the same as the energy dissipated.

Generalizing from this, we may say that, roughly, when the energy stored in the filter elements is equal to the energy dissipated in the load we have fairly good smoothing.

It usually works out, in cases like this, that if the energy stored in the two kinds of storage elements is equal, then the total material required will be economically utilized. To see what happens we will equate the two storage expressions

$$\frac{LI^2}{2} = \frac{CV^2}{2} \text{ and } V^2 = I^2R^2.$$

We also know that $I = \frac{V}{R}$, so $V^2 = I^2R^2$.

Substituting this above;

$$\frac{LI^2}{2} = \frac{CI^2R^2}{2} \text{ or } L = CR^2.$$

This gives the relation between L and C as

$$R = \sqrt{\frac{L}{C}}$$

It is interesting that this is the same relation arrived at by the telephone company method of calculation for giving minimum reflections in the pass band, and is what is called the characteristic impedance of the filter.

A filter section made up in this way, with no first choke, gave the following results:

Load voltage, d.c.	860
Load current, ma.	300
Load resistance, ohms	2870
Ripple, volts	16.
" % of d.c. output	1.9
Inductance	15 henrys
Storage	0.7 watt-seconds
Condenser, 2 μ fd. each end,	
total	4.0 μ fd.
Storage	1.5 watt-seconds
Total storage	2.3 watt-seconds
Total dissipation per cycle	2.15 watt-seconds

Ratio of resistance to $\sqrt{\frac{L}{C}}$, 1.5

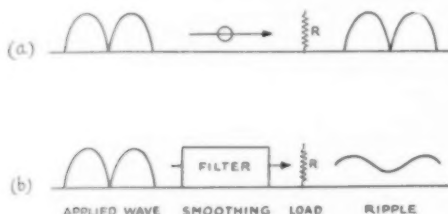


FIG. 4—(A) FOLDED SINE WAVE APPLIED TO RESISTANCE LOAD

with no smoothing gives ripple which is duplicate of impressed wave. (b) Folded sine wave through filter gives reduced ripple; almost entirely fundamental, of double frequency. Ratio of ripple (a) to ripple (b) is attenuation ratio of filter. Attenuation in decibels is

$$20 \log_{10} \frac{\text{Ripple (a)}}{\text{Ripple (b)}}$$

It is rather complicated to calculate the actual smoothing to be expected by this method, but the principles involved are well illustrated. Three definite factors result, which frequently are overlooked:

1. Smoothing by inductance results from the value of stored energy, depending upon the inductance and square of the current. This in turn determines the size of the choke, just as the watts output determines the size of a transformer. Thus chokes of 20 henrys at 316 ma., 2 henrys at 1 ampere, and 0.02 henrys at 10 amperes will each store the same amount of energy, will each be of the same approximate size and weight, and will each contribute about the same amount of smoothing to the output.

2. Smoothing by capacity depends upon the stored energy resulting from the capacity in μ fd. and the square of the voltage. Thus a 2 μ fd. condenser at 1000 volts and a 4000 μ fd. condenser at 22.5 volts will store the same energy and contribute about the same amount to smoothing. The so-called dry electrolytic condensers of the latter type are in general about the same in size, weight and cost, as the 1000-volt 2- μ fd. condenser.
3. The distribution of energy storage between the inductance and capacity should be approximately adjusted so that the square root of the ratio of henrys to farads is equal to the load resistance. Very close adjustment is not necessary, and it may be that the combination giving the least stored energy for given smoothing will not be the cheapest combination; so, fortunately, a good deal of leeway is allowable.

PREDICTION OF RIPPLE

The third viewpoint mentioned above, that of considering the filter as an added impedance, gives the best results for calculation. The ripple with and without the filter is compared, and the reduction of ripple is considered as the attenuation of the filter. In Fig. 4a is shown a folded sine wave applied directly to a resistance load. The ripple across the resistance obviously will be the same as the output of the filter. The filter, of any type, is now introduced as in Fig. 4b and reduces the ripple. Thus we can introduce a factor called the "overall impedance" of filter and load, designated by Z_r . This is the impedance which will determine the alternating current in the load when any alternating voltage is impressed upon the front end of the filter. As the load is practically a pure resistance, the voltage ripple will be proportional to the current times the resistance. The improvement due to the filter will then be the ratio of the load resistance to the overall impedance. After a number of approximations, the formula reduces to the following simple forms:

For a first choke followed by a single section filter, as is customary practice, the impedance is

$$Z_r = \frac{R \times \omega^4 \times L_1 L_2 C^2}{4}$$

$$\text{R.m.s. volts ripple across load} = \frac{0.43E \times R}{Z_r}$$

$$\frac{E \times R \times 0.43 \times 4}{R \times \omega^4 \times L_1 L_2 C^2} \text{ which simplifies to } \frac{1.72 E}{\omega^4 L_1 L_2 C^2}$$

r.m.s. volts ripple.

For 120 cycles, where $\omega^4 = (754)^4 = 32.5 \times 10^{10}$,

$$\text{volts ripple} = 5.3 \times \frac{E}{L_1 L_2 C^2}$$

Where: R = load res., ohms; $\omega = 2\pi f$; f = frequency, cycles; L_1 = 1st choke, henrys; L_2 = 2nd

choke, henrys; C = total capacity, farads; E = transformer volts per side, r.m.s. value; attenuation ratio = $\frac{R}{Z_r}$ db; attenuation = $20 \log_{10} \frac{Z_r}{R}$.

In the tests given, L was always 12 henrys, so this will simplify still further to

$$\text{volts ripple} = \frac{0.44E}{L_2 C^2}, C \text{ being } \mu\text{fds.}$$

It is convenient to express the filter effect in various ways:

1. R.m.s. volts ripple gives the actual ripple in the output.
2. The attenuation ratio of R/Z_r gives the reduction of any impressed voltage at the beginning of the filter in a straight ratio.
3. The % ripple in terms of output voltage is convenient for comparing filters operating on different voltages. This will, of course, be the actual voltage ripple divided by the d.c. output voltage of the r.a.c. system.
4. Twenty times the common logarithm of the

ratio $\frac{Z_r}{R}$ gives the attenuation of the filter

in d.b., which is convenient in dealing with radio problems where d.b. gain after the filter is to be considered.

The d.b. attenuation, while more difficult to visualize, has some other advantages.¹ In considering the amount of ripple desirable it will be found that the amount of material, and in general its cost, will be a substantially constant amount per d.b. This is useful in considering the economics of a whole system, and filters can be manufactured "by the yard," as it were, depending upon the perfection of desired results. Another simplifying feature is that units such as the d.b. can be added directly. Suppose, for example, that the output of a low power modulator is to be amplified by 50 d.b. and that the allowable ripple in the transmitting tube voltage has been found to be about 10 volts. If the modulator is to operate on 200 volts, how good must be the filtering of the plate supply? Now 200 volts d.c. at the filter terminals would mean about 250 volts per branch on the plate supply transformer and 43% of this will be the fundamental ripple applied to the filter, or 107 volts. Only about 10% of this must be allowed to get to the transmitter. The d.b. for a voltage ratio of 10 is 20. The filter must, therefore, have an attenuation of 20 d.b. more than the following amplification, or 70 d.b. The filter attenuation in these terms is given by:

$$\text{d.b. attenuation} = 20 \log_{10} \frac{Z_r}{R}.$$

Or, simplified for the test conditions, d.b. attenuation = $20 \log_{10} 0.081 L_1 L_2 C^2$, and if $L_1 = 12$ henrys, d.b. attenuation = $20 \log_{10} 0.97 L_2 C^2$.

The approximate formulas hold for most conditions giving satisfactory filtering, say 20% ripple or better. The requirements are that all

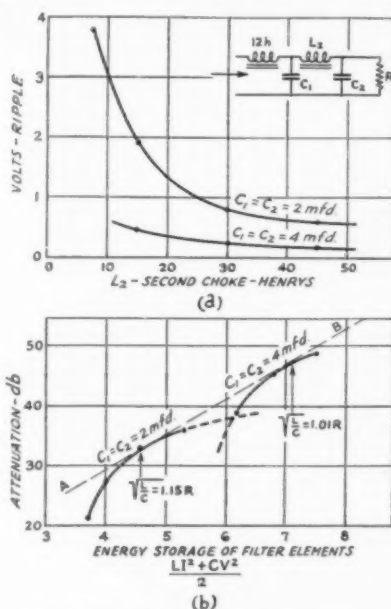


FIG. 5—(A) VOLTAGE RIPPLE FOR VARIOUS VALUES OF INDUCTANCE; DATA FROM TABLE III
(b) Attenuation for various values of energy storage, variable inductance.

circuits must be fairly far from resonance, which are satisfied if $\omega^2 LC$ is large compared to 1, say at least 4 or 5. Considering the simplest formula with the first choke of definite size, several predictions as to performance are observed.

1. The smoothing is independent of the load resistance. At first glance this seems to be wrong, since practice shows that the ripple decreases for less load, i.e., for greater load resistance. The explanation lies in the fact that what really happens is an increase in the inductance of the chokes due to a smaller direct current. If the proper values of inductance are used in the formula, the proper results will be obtained.
2. The total inductance and capacity produces smoothing, and first and second sections may have different values with the same results. This is only true to a limited extent, partly because of the approximations involved. If the first and second choke are very different in size, better results will be obtained with the smaller choke in the first section. The best smoothing is obtained with the two condensers of equal value, but one may be twice the other in capacity without material difference.

3. The smoothing improves inversely with the square of the total capacity used. This is because the added capacity improves smoothing in both the first and second sections, the attenuation being the product of the values for each section.
4. The smoothing improves inversely as the first power of the second inductance. This is because the first inductance is assumed fixed. If both chokes were increased together, the inductance would appear squared as well as the capacity. As the first choke is determined from other criteria, and as excellent smoothing is obtained without requiring larger values, the best interests of design appear to be served by keeping it at a constant value. However, the formula should not be interpreted to mean that capacity is better than inductance for smoothing.

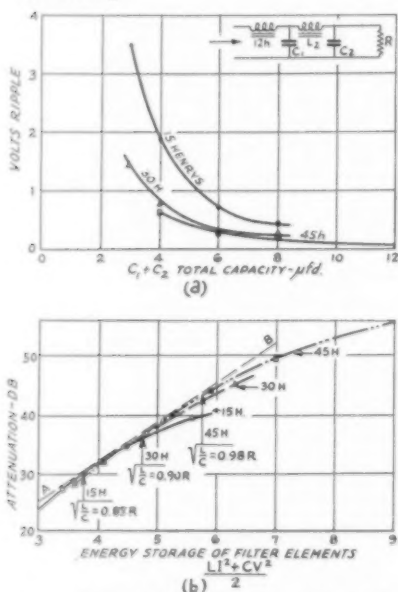


FIG. 6—(A) VOLTAGE RIPPLE FOR VARIOUS VALUES OF CAPACITY, DATA FROM TABLE IV
(b) Attenuation for Various Values of Energy Storage, variable capacity.

5. The voltage ripple varies directly with the impressed volts. This is, of course, to be expected. The attenuation of the ripple is independent of voltage; therefore actual ripple in volts will vary with the initial amount upon which the attenuation operates.

The following tables show comparisons of experimental and calculated results for filters of this type, the above formulas being used. The results are plotted graphically in Fig. 5. The correspondence between test and calculations

is unexpectedly good in most cases. It gives the proper magnitude in all cases; which, after all, is the designer's chief aim. Small differences in actual ripple disappear completely when com-

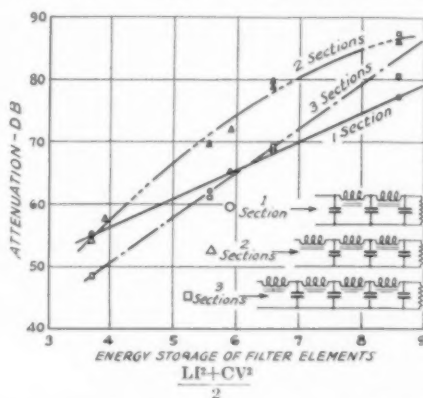


FIG. 7—FILTER ATTENUATION WITH DIFFERENT NUMBERS OF SECTIONS FOR VARIOUS VALUES OF ENERGY STORAGE
Data from Table V

pared with the wide range of decibels used in the radio art.

MULTI-SECTION FILTERS

Filters consisting of a first choke followed by a single section give entirely adequate smoothing for the majority of amateur needs. When exceptional ripple attenuation is desired, however, the addition of further sections often may be preferable to adding to the size of units in the more standard type. In other words, if the units are so large that the resonance points are very far below the operating frequencies, more attenuation will be obtained by adding sections of smaller units, even though the resonance points are raised. A rough and ready rule for the best number of sections is given by the following formula:

$$n = \sqrt{\frac{\omega^2 LC}{16}}$$

Where L is total inductance, excluding the first choke, in henrys, C is total capacity in farads, ω^2 is $(2\pi f)^2 = 0.57 \times 10^6$ for 120 cycles.

As this formula involves some very rough assumptions and disregards losses in the filters, it usually gives slightly too many sections; but it does serve as a guide as to whether or not it would be advisable to break up the filter into more sections.

DISCUSSION OF TEST RESULTS, TABLE III AND CURVES OF FIG. 5

The tests covered by all the tables were carried out as described above following the circuit of Fig. 2. The first columns cover the values of L

TABLE III
SMOOTHING WITH CONSTANT CAPACITY AND VARIABLE INDUCTANCE
 $L_1 = 12$ henrys
 $L_2 = \text{variable}$
 $C_1 = C_2 = 2 \text{ \& 4 } \mu\text{fd.}$
 $R = 2870$ ohms

	L_2	C_1	C_2	Volts Meas.	Ripple Calc.	Z_r	Attenuation Ratio	D.B.	% Ripple	$LI^2 + CV^2$ 2
1. a.	7.5	2	2	3.8	3.85	$.336 \times 10^6$	$.855 \times 10^{-3}$	21.2	0.44	3.7
b.	15.0	2	2	1.9	1.92	.672	.427	27.2	0.22	4.0
c.	30.0	2	2	0.8	0.95	1.34	.214	33.4	0.09	4.6
d.	45.0	2	2	0.6	0.64	2.02	.142	36.8	0.07	5.3
2. a.	15.0	4	4	0.45	0.48	2.68×10^6	.107	39.4	0.052	6.2
b.	30.0	4	4	0.24	0.24	5.36	.535	45.5	0.028	6.8
c.	45.0	4	4	0.17	0.16	8.04	.357	49.0	0.020	7.5

TABLE IV
SMOOTHING WITH CONSTANT INDUCTANCE AND VARIABLE CAPACITY
 $L_1 = 12$ henrys
 $L_2 = 15-30-45$ henrys
 $C_1 \text{ \& } C_2$ variable
 $R = 2870$ ohms

	L_2 h	C_1 $\mu\text{fd.}$	C_2 $\mu\text{fd.}$	Total C $\mu\text{fd.}$	Volts Meas.	Ripple Calc.	Z_r Ohms	Ah. Ratio	D.B.	% Ripple	$LI^2 + CV^2$ 2
1. a.	15	1	1	2	7.0	7.4	$.168 \times 10^6$	17.2×10^{-3}	15.4	0.81	2.3
2. a.	15	1	2	3	3.5	3.3	.378	7.6	22.8	0.41	2.9
b.	15	2	1	3	3.5					0.41	
3. a.	15	2	2	4	1.9	1.8	.672	4.3	27.2	0.22	3.4
4. a.	15	2	4	6	0.71	0.82	1.51	1.9	34.6	0.095	4.5
b.	15	4	2	6	0.71					0.095	
5. a.	15	4	4	8	0.45	0.45	2.69	1.1	39.4	0.052	5.6
6. a.	30	2	1	3	1.45	1.71	$.75 \times 10^6$	3.8×10^{-3}	28.4	0.170	3.6
b.	30	1	2	3	1.45					0.170	
7. a.	30	2	2	4	0.80	0.95	1.33	2.16	33.4	0.093	4.1
8. a.	30	4	4	8	0.24	0.23	5.32	0.54	45.4	0.028	6.3
9. a.	45	2	2	4	0.60	0.64	2.01×10^6	1.43×10^{-3}	36.8	0.07	4.8
10. a.	45	2	4	6	0.35					0.041	
b.	45	4	2	6	0.30	0.29	4.53	0.63	44.0	0.035	5.9
c.	45	3	3	6	0.27					0.031	
11. a.	45	2	6	8	0.21					0.024	
b.	45	6	2	8	0.22	0.16	8.05	0.36	49.0	0.026	7.0
c.	45	4	4	8	0.17					0.020	
12. a.	45	2	10	12	0.112					0.013	
b.	45	4	8	12	0.068	0.071	18.10	0.16	56.0	0.008	9.1
c.	45	6	6	12	0.061					0.007	

TABLE V
COMPARISON OF SINGLE AND MULTI-SECTION FILTERS
 $L_1 = 12$ henrys
 $L_2 - L_4$, etc., as given
 $C_1 - C_2$, etc., as given
 $R = 2700$ to 2900 ohms

No.	Total L & C	Distribution L	Distribution C	Volts Meas.	Ripple Calc.	Z_r $\times 10^6$	Atten. Ratio $\times 10^{-3}$	D.B.	% Ripple	$LI^2 + CV^2$ 2
1. a.	26h.	26	2-2	0.80	1.10	1.61	1.78	55.0	.093	3.71
b.	4 $\mu\text{fd.}$	13-13	1-1-2	0.85	1.50	1.51	1.89	54.4	.099	
c.	$n = 1.9^*$	6.5-6.5-6.5†	1-1-1-1	1.63	16.40	0.79	3.62	48.8	.190	
2. a.	30h.	30	2-2	0.80	0.95	1.61	1.78	55.0	.093	3.89
b.	4 $\mu\text{fd.}$	15-15	1-1-2	0.80	1.06	1.61	1.78	55.0	.093	
3. a.	30h.	30	4-4	0.24	0.24	5.3	.535	65.4	.028	5.80
b.	8 $\mu\text{fd.}$	15-15	2-2-4	0.11	0.11	12.0	.245	72.2	.013	
4. a.	45h.	45	3-3	0.350	0.285	3.7	.780	62.0	.041	5.56
b.	6 $\mu\text{fd.}$	30-15	2-1-3	0.144	0.112	9.0	.320	69.8	.017	
c.	$n = 3.1$	15-15-15	2-1-1-2	0.380	0.014	3.4	.850	61.4	.044	
5. a.	45h.	45	4-4	0.165	0.160	7.8	.370	68.6	.019	6.56
b.	6 $\mu\text{fd.}$	15-30	2-2-4	0.048	0.044	27.0	.107	79.4	.006	
c.	$n = 3.6$	30-15	2-2-4	0.051	0.044	25.3	.114	78.8	.006	
d.		15-15-15	2-2-2-2	0.098	0.018	13.2	.218	69.2	.011	
6. a.	45h.	45	6-6	0.061	0.071	21.1	.135	77.4	.007	8.56
b.	12 $\mu\text{fd.}$	30-15	4-4-4	0.021	0.013	61.4	.047	86.6	.025	
c.	$n = 4.4$	15-30	4-4-4	0.022	0.013	58.6	.049	86.2	.025	
d.		15-15-15	2-2-4-4	0.020	0.008	64.5	.045	87.0	.023	
e.		15-15-15	2-2-2-6	0.041	0.008	31.4	.091	80.8	.048	

* "Best" number of sections from: $n = \sqrt{\frac{a^2 LC}{16}}$

† 6.5 henrys added to L_1 to avoid resonance.

‡ $\frac{LI^2 + CV^2}{2}$ includes 12 henrys for first choke.

and C used. The calculated ripple comes out almost exactly the same as the measured value. The percent ripple is obtained by dividing the observed value by the terminal voltage of 860. The extreme right-hand column gives the total size of filter units in terms of watt-seconds storage. Plotting the observed values of ripple and size of second choke in Fig. 5a shows the relation between the two. This curve can be used directly to obtain the desired sizes of choke and condenser within its range for any voltage operating into the same load resistance, since the ripple is calculated for almost exactly 1000 volts per transformer side. Any other voltage would produce proportional ripple. Furthermore, the results can be used roughly for other values of resistance load, since only very wide departures from test conditions change the ripple, *provided that the true inductance is known for the current resulting from the proposed voltage and resistance.*

Curves in Fig. 5b are more interesting from an engineering standpoint, but are more difficult to visualize and require calculation for use. The d.b. attenuation is plotted against the total energy storage of the filter system. It will be noted that for each value of capacity, changes in inductance make two curves. The line A-B is drawn tangent to these two curves. Some other value, say 3 μ fd. in each leg, would give another curve lying between the two plotted and tangent to the line A-B at some intermediate point, such as 6 watt-seconds. Therefore it is evident that *for each value of shunt capacity there is some value of inductance that will give more attenuation than any other value.* Taking the two tangent points in Fig. 5b and interpolating constants, we find

that these correspond to a value of $\sqrt{\frac{L}{C}}$, substantially equal to the load resistance. This conforms to the condition of equal energy storage in chokes and condensers discussed above and the desirability of this relation is thus shown empirically by the tests.

DISCUSSION OF TEST RESULTS, TABLE IV AND CURVES OF FIG. 6

These tests were very similar to those covered under Table III except that the inductance was held constant and the capacity varied. Three values of inductance were used. In each group the distribution of the condensers was varied and it will be seen that little or no change in ripple resulted. For other reasons, best operation usually will be obtained with the larger condenser in the last position. For example, in group 11, a, b and c, the 8- μ fd. condenser was split up with 2-6, 6-2 and 4-4 μ fd. Very little difference in ripple was observed for the three combinations. Even distribution of capacity gives slightly the better results, and the value checking closest

with the calculated value. As filter design calls for uniform distribution of condensers in the formulas used, this is of course to be expected. The greatest difference due to non-uniform distribution occurs in group 12, line a, where 12 μ fd. distributed as 2-10 gives almost double the ripple obtained with equal capacity in each leg. With this amount of energy storage, however, the ripple is so small that either one would be very satisfactory for almost any power supply which did not have great subsequent amplification.

The curves of Fig. 6a are plotted in similar manner to those of Fig. 5a and are self-evident. The same remarks hold as to their availability for interpreting filters used with other power combinations. The curves of Fig. 6b show the same type of curvature as before, although it is not so pronounced. The line A-B was drawn as before and, estimating points of tangency, we find that the best filter combinations for maximum attenuation with minimum material occur

when $\sqrt{\frac{L}{C}}$ is close to the value of the load resistance.

This point is not very critical and considerations of cost might result in some other combination being cheaper or lighter. Therefore starting with the inductance-capacity ratio as a first criterion, the particular point it is desired to emphasize can be studied. If energy storage is greater than 4 or 5 watt-seconds it is probably better to go to a multi-section filter anyway.

The calculation of voltage ripple for multi-section filters becomes more difficult, the approximate formula being given below. Small errors in the values of inductance are greatly multiplied by the term raised to the power of the number of sections. For example if: $\omega^2 LC$ is about 4, subtracting 2 from it and then cubing, for a three section filter, obviously will give a result very wide of the mark unless the constants are very closely known. Therefore such calculations will give only the magnitude of results, but are useful as guides. More accurate calculation can be obtained with more detailed formulas and by taking into account the losses in the filter circuit; but this becomes rather involved and much too complicated to consider here.

The formula for calculating Z_r is

$$Z_r = \frac{\omega^2 R L_1 C}{2} (\omega^2 L_n C - 2)^n.$$

The terms are to be evaluated as follows:

$\omega^2 = (2\pi f)^2$ or 0.57×10^6 for 120 cycles.

R is the load resistance in ohms.

L_1 is the inductance of the first choke in henrys (12 henrys).

C is the capacity per section, which is taken as the total capacity divided by $(n+1)$ when not equally distributed.

(Continued on page 88)

AMATEUR RADIO STATIONS

WIAPK, Pembroke, N. H.

WIAPK is located on the Daniel Webster Highway between Concord and Manchester, N. H. Basil F. Cutting is the owner and operator. Both c.w. and 'phone are used, the latter on the 1750- and 3500-ke. bands, and c.w. chiefly on 3500 ke.

The transmitter, shown separately in one of the accompanying photographs, is a totally enclosed panel-mounted outfit. The r.f. part is an oscillator-amplifier, consisting of a Type '10 oscillator with 500 volts on the plate exciting a Type '11 "50-watt" tube. For c.w. the plate voltage on the amplifier is 1100, while for 'phone it is dropped down to 800 volts. Plug-in coils are available for all bands.

For 'phone a 211-D tube is used as a modulator, preceded by two stages of speech amplification. The first stage is a '12-A with 150 volts on the plate and the second stage a '47 with 250 volts. The plate voltage on the modulator is 1100, a dropping resistor being used to reduce the plate voltage on the modulated amplifier. A Gavitt double-button microphone completes the speech equipment.

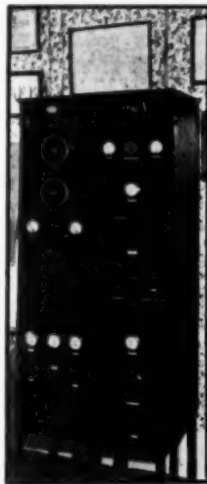
The power supply equipment includes an 1100-volt transformer, Type '66 mercury-vapor rectifiers and a filter consisting of a 30-henry input choke, a 2- μ fd. condenser, a second 30-henry choke, and a final 2- μ fd. condenser. The oscillator receives its plate power from this unit through a voltage-dropping resistor. A second filter is pro-

vided for the oscillator voltage to help prevent voltage variations.

A Philco 7-tube superhet combined with a two-tube converter forms the main receiving equip-

WIAPK'S SELF-CONTAINED TRANSMITTER

The r.f. circuits, speech equipment and power supply are all controlled from the panels.

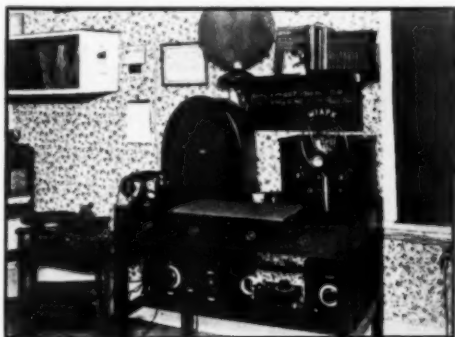


ment. There is also a three-tube regenerative outfit for emergencies, as well as a calibrated frequency meter and monitor.

The antenna is a 132-foot Hertz with a 45-foot single-wire feeder. This is used "as is" for 3500-ke. work; for 1750 ke. a second 132-foot wire seven feet off the ground is added to the system to make a current-fed bent antenna.

Strays

A few copies of *The Regulation of Amateur Radio Communication*, by Paul M. Segal, reviewed on page 72 of November, 1931, *QST* are still available. This 56-page booklet traces the development of government regulation of amateur activities in the United States, and contains extensive references of value to the serious amateur. Those wishing to gain a clear picture of the position of the amateur in the radio world will do well to possess themselves of a copy. They may be obtained from the American Radio Relay League, West Hartford, Conn., for twenty-five cents each.



RECEIVING TABLE AT WIAPK

The midget b.c. receiver on the table works with the converter in the cabinet at the right to form a high-frequency superhet. Monitor, frequency-meter and a second receiver are on the shelf under the table.

EXPERIMENTERS' SECTION

A CONVERTER FOR THE ULTRA-HIGH FREQUENCIES

THE wiring diagram of Fig. 1 is that of a superhet converter for the 50-mc. region which, according to its designer, V. K. Hatfield, W6BXR, is much superior to the usual super-regenerative receiver. The converter is used with a regular broadcast receiver.

The values given may require some modification for 5-meter work since the converter was built primarily to receive television signals broadcast from W6XS on 44.5 mc. Some idea of the changes that might have to be made to reach 56 mc. can be gained from the fact that 44.5 mc. is tuned in with the variable condensers set at about 75% of full capacity. Stray capacities play such an important part in the picture at ultra-high frequencies, however, that getting the right frequency range is almost certainly a matter for cut-and-dry.

The coils are all wound on the same form, the spacing between L_2 and L_3 being about two inches. This provides sufficient coupling between the oscillator and detector. An alternative coupling scheme is to connect a 50- μ fd. condenser between

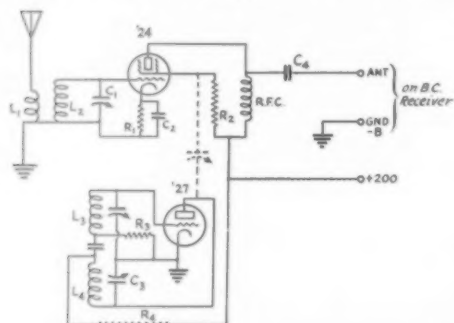


FIG. 1—SEVEN-METER CONVERTER CIRCUIT

- L_1 —2 turns of No. 14 wire on half-inch diameter form.
- L_2 —4 turns of No. 14 wire on half-inch diameter form.
- L_3 —4 turns of No. 14 wire on half-inch diameter form.
- L_4 —4 turns of No. 14 wire on half-inch diameter form.
- C_1 —Pilot 100- μ fd. midget with alternate plates removed.
- C_2 —.01 μ fd.
- C_3 —Hammarlund 100- μ fd. midget with stator split.
- C_4 —250 μ fd.
- R_1 —5000 ohms.
- R_2 —250,000 ohms.
- R_3 —15,000 ohms.
- R_4 —25,000 ohms.
- RFC—Broadcast band r.f. choke.

the oscillator plate and detector screen-grid, as indicated in the dotted lines in the diagram. If this arrangement is used inductive coupling between the two tube circuits is unnecessary.

A Multi-Range Voltmeter and Milliammeter

By Leonard B. Gallup *

The voltmeter herewith described has the advantage of being compact and convenient—all the resistors, shunts, switches and the movement itself, are contained in one small wooden box 6½" high by 7" wide. By means of two tap switches, one can, with a twist of the wrist, choose any one of the following ranges: 0-1,

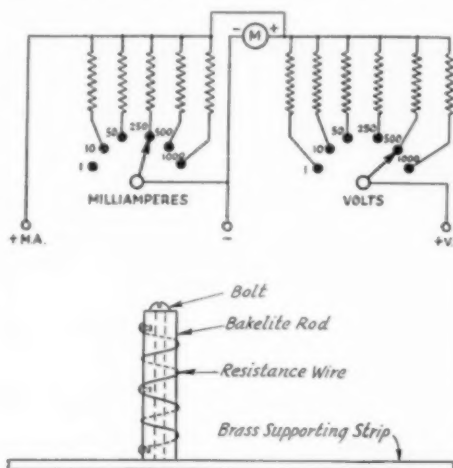


FIG. 2

10, 50, 250, 500, and 1000 volts or milliamperes.

The meter is a Weston model 301, bakelite case, with a range of 0-1 milliamperes, having a resistance of 27 ohms. This was first dissected in order to get at the scale, which is accomplished by removing the three very small screws in the side of the case after which the "works" can be slid out. It might be noted in passing that the one small screw hole which is usually soldered and sealed is in this model filled with some kind of compound which can easily be chipped out, saving the rather mean job of melting out the solder. A scale having the desired readings was dug up in one of the Weston catalogs describing their analyzers. This was carefully cut out and pasted over the 1-mil. scale. I understand that scales with any particular readings may be obtained from the manufacturer, but if care is exercised

* 9 Chestnut Street, Albany, New York.

in the pasting process, a very neat job will result.

The box used is one of those old Signal Corps detector units and the switches also were taken from the panel furnished with it. These switches, the meter and three Eby binding posts are mounted on a bakelite panel about 5 by 6 inches. A small rack made from brass strip is mounted on the back to support the resistors.

The voltmeter resistors are Shallcross "Acra-ohms," and the shunts are home-made from resistance wire of about 10 ohms per foot, wound on bakelite rods. The values of each are given in the table below.

Range	Volts	Ma.
0-1	1,000 ohms	0.000 ohms
-10	10,000 "	3.000 "
-50	50,000 "	.551 "
-250	250,000 "	.108 "
-500	500,000 "	.054 "
-1000	1,000,000 "	.027 "

This, of course, gives a 1000-ohms-per-volt voltmeter, the high resistance of which enables one to make measurements without materially altering the circuit constants, which often happens with a low-resistance unit. The shunts were measured up on a Wheatstone bridge before being put together, and then wound as shown in the drawing. For the higher ranges, four or five lengths of the wire are used in parallel to be on the safe side so far as current carrying capacity is concerned. The wiring of the meter is shown in Fig. 2.

As well as providing a number of meters at the cost of one or two, this instrument saves a lot of handling of various meters. It is mounted upon a shelf at about eye level in my shop, and two 'phone cords terminating in 'phone plugs are connected to the binding posts. The proper varieties of jacks are employed in the various electrically strategic points. It is a simple matter to plug in for the reading.

VACUUM TUBE RELAY FOR THERMOSTATS

Fig. 3 shows the wiring of an inexpensive device that some of the boys may find useful. It is a vacuum tube relay that can be used to control the heater circuits of quartz crystal ovens.

When the thermostat directly controls the heater current the break often is slow, tending to spoil the temperature regulation as well as creating objectionable interference in nearby receivers. This can be overcome by putting the control in a circuit where no sparking occurs, such as the plate circuit of a vacuum tube, and utilizing the thermostat only for controlling the grid bias of the tube.

In my set-up the tube is a Type '71-A, although any tube which will pass enough plate current to operate the relay will be satisfactory. The relay itself — usually an expensive item — is an ordinary 2500-ohm bell ringer taken from

an old telephone box. The transformer puts about 200 volts on the plate of the tube and 70 volts on the grid. The chief point about these voltages is that the plate voltage should be high enough to close the relay when the thermostat is open, and

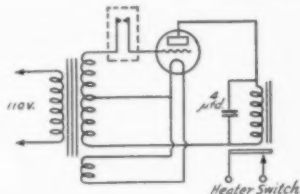


FIG. 3

the grid voltage should be such that when the thermostat is closed the heater relay will open.

When the thermostat controlled the heater current directly the oven temperature varied about two degrees; with this arrangement the variation is not over .1 degree. Only a slight click is heard in the receiver when the relay operates.

— Edward C. Carnes, W9DLG

REMOTE CONTROL MADE SAFE

The circuit of Fig. 4 may prove of interest to those who use remote control. It is employed at this station, where the rectifier and transmitting tubes are burning continuously while operating. If the filament relay should become disconnected or stick the plate supply cannot be turned on,

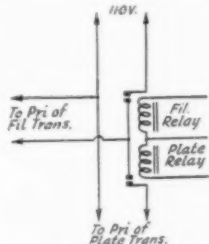


FIG. 4

since the filament relay controls the primary supply to the plate transformers.

— J. H. Carr, W7OL

Strays

W1PH recommends the shielded lead-in wire that can be purchased quite cheaply nowadays for use as a feeder to a Zepp receiving antenna. The insulated wire connects to the antenna, and the shield serves as the dead-end feeder. This saves the bother of running spaced feeders.

Quartz is quartz — to some people. For instance, there's the chap who sent a broken piece of a G.E. sunlamp to one of QST's advertisers and asked to have it ground to a frequency in the 3500-ke. band! It's no good.

• I. A. R. U. NEWS •

Devoted to the interests and activities of the
INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM

Vice-President: C. H. STEWART

Secretary: K. B. WARNER

Headquarters Society:

THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League
Asociacion E. A. R.
Associazione Radiotecnica Italiana
Canadian Section, A. R. R. L.
Deutscher Amateur Sende-und-Empfangs
Dienst
Experimenterende Danske Radioamatører

Lwowski Klub Krotkotalowcow
Nederlandsche Vereeniging voor In-
ternationaal Radioamateurisme
New Zealand Association of Radio
Transmitters
Norsk Radio Relæ Liga
Radio Society of Great Britain
Rede dos Emissores Portugueses

Reseau Belge
Reseau Emetteurs Français
South African Radio Relay League
Sveriges Sandareamatörer
Union Schweiz Kurzwellen Amateur
Wireless Institute of Australia
Wireless Society of Ireland

Conducted by Clinton B. DeSoto

THE close of the year 1931 marked the third year of operation of the I.A.R.U. under the present constitution. The Union is now nearly seven years old. Of these years, 1931 was undoubtedly fraught with the most activity in Union history, both on the part of member-societies and at headquarters.

This activity was summarized in detailed fashion in I.A.R.U. Calendar No. 7, dated December, mailed to officials of member-societies in accordance with the constitution. The number of these societies, listed at the top of this page, remains the same as a year ago: nineteen. One application for membership is under consideration by the members at the present time, others are being reviewed by the headquarters.

The principal topic under consideration in the current Calendar is that of preparation for Madrid, and the bulk of the discussion concerns itself with that subject. A detailed campaign has been mapped out by the headquarters for the consideration of the members, and the national societies are at present unifying their forces for direct Madrid representation. The sentiment of amateurs and governments in general is found to be encouraging. Additional proposals to be voted on by the membership include an amendment to the constitution providing for annual reports by the national societies, and one by the R.S.G.B. concerning the requirement of I.A.R.U. membership for WAC eligibility.

A final glance at the year 1931 in the following quoted paragraph pointed out many forward strides. "In general, 1931 has been one of the most active periods in the history of the Union, characterized particularly by a marked increase

in cordial relationships between the various member-societies and their respective government authorities. With but few exceptions, friendlier relations exist than at any time in amateur development. Tangible manifestations of this feeling have been the granting of increased privileges in some form or other in many of the countries represented in Union membership. These benefits have been due primarily to the excellent work of the various member-societies in bringing to their authorities a clearer understanding of amateur work and amateur needs."

Despite the impending struggle ahead, prospects for 1932 look equally bright, and fully as great advances in each of our represented countries may be expected.

Considering the theoretical handicaps under which 28 mc. work is carried on at the present time, recent results in this field make a point of considerable interest. The Australians, for example, turned out a mighty fine job in their November, 1931 week-end tests on this band. Summed up by Jack de Cure, VK3WL, 97 contacts were made with interstate stations by the VK3 gang, the distances covered ranging from local to approximately 1100 miles. More than two dozen stations participated, working not only in the daytime, but on until midnight to take advantage of the sunset hours in India and Ceylon.

An interesting sidelight on this VK activity is the fact that all of the arrangements for these tests, local, national, and international, were handled via the medium of amateur radio—which is as it should be.

The R.S.G.B. January 28-mc. tests were not

productive of outstanding results in view of past performances, but many local contacts were established, according to J. Clarrieots, Hon. Secretary. The M.R.A.E. tests announced in these columns in February have already resulted in the hearing of some of the Hungarian stations by G6WN.

Opportunity for some significant 28-mc. testing is offered by C. W. Brown, VU3CW, No. 3 Bungalow, No. 2 Indian Wing, Risalpur, N.W.F., India. Three operators in that mountainous region are actively interested in breaking some "ten-meter" stuff through the shielding offered by the high surrounding ranges, and seek contacts for the conduct of regular test schedules.

We shall be much interested in the outcome of the remaining tests scheduled for this band during the current season. Possibly some really significant data will be uncovered during these months which are of so much interest to students of radio propagation.

One change, one correction, and one addition to be made to the QSL Bureau list published in full in the February issue. The new address for the Irish Free State is W.S.I. QSL Bureau, c/o R. V. N. Sadleir, Esq., Lonsdale, Roebuck, Clonskeagh, Dublin.

Latvia should have been one of the countries marked with a star in the February list to indicate that cards should be sent only to the official bureau. Please adopt the usual precautions whenever a Latvian station is worked. An alternative route is through the D.A.S.D.

The new "Relais QSL" address for Morocco is as follows: Journal la Radio Africaine, Bourse de Commerce, Casablanca.

Brief items of gossip from the month's mail: The R.E.F. has thoroughly reorganized its "Section Experimentale," dividing all members into an orderly group system. . . . Dr. E. B. Gerlach, WSCMG, acquiring WAC Club membership, has only one ham ambition left — to work WIMK! . . . Moroccan amateurs, numbering 14 stations (11 licensed) met to form an independent society but decided instead to become a special section of the R.E.F. . . . They are negotiating with the French authorities for the official granting of the prefix "CN." They've been using it right along, but the government has been officially calling them "F's." . . . G6LI contacted a K4 in San Juan, Porto Rico, on 3.5 mc. last Jan. 11th, reports G6CL. . . . The N.V.I.R. countries-worked contest finds PA0DW passing PA0QF with a total of 67 countries. . . . R.S.G.B.'s 488 new members elected during 1931 made a net increase in the membership of 24% for the year. . . . Indications are that most other I.A.R.U. societies enjoyed gratifying increases. FB!

Norwegian Amateur Radio

By G. H. Petersen, LA1D, Pres. N.R.R.L.

The radio amateur movement in Norway is not very old. All kinds of radio, including reception, were strictly forbidden to private persons until the arrival of broadcasting, and the transmission ban was not lifted until early in 1926. Of course there were some experimenters well



RECENTLY WAC, S. FABINI hijo, CX2BT, AV. SUAREZ 2953, MONTEVIDEO, URUGUAY

has one of the South American signals heard consistently in almost every part of the world.

before that date, notably our pioneer short-wave station LA1A, then Moen in Maalselv, who made some epoch-making tests in short-wave communication between the northern and southern parts of our country, and LA4X in Stavanger, who was one of the first to work whaling expeditions in the Antarctic.

The birth of Norwegian amateur radio may well, however, be dated 1926, when the first licenses were granted. This year also marks the starting of our first short-wave club, the Norwegian Amateur Senders' Union (N.A.S.U.) which, however, soon ceased its activities, the number of transmitters being far too small and interest lacking. The distribution of QSL cards and other short-wave work was taken over by the existing union of broadcast listeners' clubs, the Norsk Radioforbund, where a special section was formed for the purpose. Members of this section tried to reach the number of individual memberships in the I.A.R.U. then required to form a national section, but when the I.A.R.U. organization structure was changed, this work had to be abandoned.

This and other facts made the formation of a special short-wave club a necessity, and in 1928 some interested amateurs met to form the Norsk Radio Relæ Liga (N.R.R.L.). This venture met with immediate success, the number of members as well as the interest growing rapidly, so that the League now comprises about 225 members, of which nearly 50 are transmitters, scattered all over the country. The rest are short-wave enthusiasts or registered listeners, and most of them are coming men in the transmitting game.

(Continued on page 84)

• CALLS HEARD •

W9FFQ, Milton Carlson, 413 S. Second St.,
Rockford, Ill.

ce1ao ce2ab ce3ch ce7aa em1by em1fm em2ef em2fc em2jm
em2mm em2pa em2ra em2sh em2wa em2wd em5ni em8uf
em8yb em8mop et1aa et1bx et1ew et1aa ce2bt d4uak ear10
ear21 ear96 ear185 ei7e ei8b f3mta f3oed f8eo f8ex f8fo
f8hr f8jf f8px f8pa f8vj f8tq f8tv f8xz fm8er fm8mat freari
g2ao g2by g2ej g2cu g2ex g2df g2dh g2ol g2vq g5bj g5bz
g5fe g5mb g5ml g5ni g5hp g5ig g5wl g6xn g6yk helif hc2jm
j1et kd5v kfu2 k4bpf k4kd k4rj k5aa k6agi k6bhl k6cab
k6oog k6dmm k6dqf k6dv k6deg k6etf k7atd k7ef lules
lu2ea lu3de lu3dh lu3fa lu3oa lu3wb lu4da lu6dj lu9dt
nn1nie oa4c oa4i oa4q oa4u oa4y oa4z oh7nb on4fe on4fm
on4fp on4gn on4he on4jb on4je on4jj pa0dl pa0fb pa0gg
pa0ps pa0ws pa0xps pk4aj py1aa py1ba py1ca py1em py1cr
py1ff py1ib py1zo py2ak py2as py2ba py2bk py2bm py2bn
py2bq py2qa py3aa py3ab py6bb py7aa py8ia py9he rx1aa
rx1pa rx2ags ti2fg ti2wd ti3la vi1ba vi1yb vi2et vk2oc
vk2tx vk3ka vk3ml vk3nm vk3rw vk3wl vk4ll vk4tk vo8ae
vo8an vo8s vp2pa x1aa x1d x1n x2bi x3a x5x x9a x29b
yv3lo yslfm z1aa z1ar z1ce z1ba z1go z1gw z1ar z13c
zs5c xw1b b7x pxx fx vn2bg xebm nams gx2tm xeba xebq

K6LG, F. D. Brunton, Agana, Guam, Ladrone
Islands

(14- and 7-mc. bands)

vk2sa vk2ns vk2hu vk2ka vk2mr vk2eo vk2oc vk2xm
vk2xu vk2jh vk2za vk2ow vk2xy vk2ja vk3kr vk3ka vk3gk
vk3nm vk3hk vk3ml vk3ka vk3kr vk3dx vk4rw vk4jr
vk4fb vk4fk vk4kg vk4ba vk4xn vk5bo vk5ju vk5kw
vk5mf vk5jh vk5ka vk6vi w2mk w4akg w5va w5vq w5bbr
w5rv w6ef w6aor w6dzo w6lwi w6efr w6dmj w6biz w6dwi
w6ebn w6axm w6ajl w6ema w6exq w6yu w6za w6evf w6egh
w6egk w6eqq w6ecu w6dfn w6ebm w6dza w6ebi w6bee
w6bbk w6yo w6dtt w6alz w6ef w6efr w6ffw w6lt w6egw
w6eif w6ahp w6ebx w6byy w6bbp w6dep w6cep w6evm
w6ert w6apd w7tx w7fv w7mx w7aij w7acx w9bqw ac2eb
z1ad z1ce z12oe z12ci z12gw z12gq z12dx z13ca z13as z13ag
z13rm k4hw k6ddf k6exp k6avi k6exy k6dv k7aml aukok
aunt j1dv j1ec j1dn j1do j1dr j1px j1ey j2cxw j3eq vp1ws
vp2br vs1rd vs6af vs6an vs6ae eu2kb ti3la yr1x ear8 obek2
pk3bq dehv ekn

W2CKR, Edwin J. Sahm, 2390 Davidson Ave.,
Bronx, N. Y.

(14,000-kc. band)

w6apj w6aqj w6awo w6bam w6bfb w6bif w6bja w6bdz
w6cyv w6dew w6djv w6eqq w6cep w6efm w6ein w6exq
w6vb w7afu w7aip w7aol w7ayj w7bce w7bd w7bgh w7nm
ce1ai em2cf em2le et1aa ex2bt f8bs f8ex f8rj g2yd g6vp
k4rk k5aa oa4u oa4s on4au on4gn on4jb rx1aa ti2ags ti2fg
ti2tao ti3la vp2pa x1aa x1m x9a

Phone

w6ahp w6eim w6zh ti3la x1aa

W9ARL, John G. Marshall, 2954 Hiawatha Ave.,
Kansas City, Kans.

(7000-kc. band)

ab2by ce3ag ce3dg em1by em2ej em2er em2le em2op em2pa
em2ev em2xr em8as em8yb helif hi8x hk3rg kalce kalhr
kaljm kn9pb k4bu k4rj k4rk k4vg k5aa k6aja k6avi
k6bbh k6bij k6cab k6exy k6dmm k6eln k6etf k6fcx k6lr
k7hb k7hz k7wm kd5v kda5 niij n1t n1nie nylaa odr
om1ao om1tb om2es om2tg rx1aq ti2bf ti3la vk2ax vk2ba

vk2jh vk2jk vk2lx vk2ns vk2oe vk2oe vk2rg vk2wd vk2wu
vk3bd vk3bw vk3bz vk3de vk3ek vk3hk vk3jk vk3jt vk3ka
vk3ks vk3ml vk3pp vk3rg vk3rq vk3tm vk3wk vk3wx
vk3gx vk3wz vk3xi vk3aw vk3as vk4fb vk4hg vk4ju vk4ll
vk4ou vk5bo vk5do vk5gr vk5le vk5lx vk5mb vk5md
vk5zk vk5yk vk6vi vk7ch vk7jk vp2oe wlm wlj wlj2 x1aa
x1ax x1d x1g x1ia x1m x9a z1lbn z1nac z1bi z12oe z12ej
z12eu z12fm z1fy z1gd z13aq z13as z13bu z13ca z13cm z14ba
z14bg z16a

em1by em2mm em2wa em2ww ce3ch g2gf g2nh g6xj helif
k6boe oa4c oa4y py1xo py2bq pxx rx1aa ti3la vk2tx x1aa
x1n x3a x9a z1ce z1fe z14ba

E. Richard Knowles, 10618 Pippin St., Oakland
Calif.

(14,000-kc. band)

w1bje w1boi w1km w1mk w1eo w1uh w1vo w1ya w1za
w2aba w2adf w2afd w2ah w2axt w2bcp w2bmz w2bjc
w2jy w2zmn w3cho w3ok w3wh w3cep w4agx w4alv w4hr
w4lx w4nn w4sd w4tm w5aan w5aat w5abk w5ach w5ael
w5ait w5ajp w5aoh w5arx w5asp w5az w5aar w5bbr w5bee
w5bij w5bjt w5bk w5bqe w5btb w5bwj w5de w5dq w5ew
w5fw w5fx w5ga w5it w5nk w5op w5ox w5sh w5uf w5rv
w5wr w5yh w6ael w6acp w6adk w6aah w6ahu w6aic w6air
w6ajp w6akh w6alt w6am w6anq w6aos w6apj w6apm
w6ast w6atj w6ave w6awd w6awj w6awo w6awq w6ayp
w6azx w6bba w6bbl w6bbo w6bbv w6bda w6bdi w6bil
w6bij w6bim w6bis w6bjf w6bkf w6bla w6bmm w6bmr
w6bny w6bot w6bqe w6baf w6bvf w6bwa w6vzf w6cam
w6cbe w6cbw w6cca w6cdg w6cdk w6cdp w6cgp w6chl
w6chw w6cid w6ciy w6cjk w6cja w6ckm w6cnb w6cpe
w6ceg w6cqe w6cra w6cvi w6cve w6cwl w6cwp w6cwr
w6cwh w6cxz w6cye w6cyy w6cyy w6cye w6cye w6cye
w6dbp w6ddd w6dde w6dgy w6dgy w6dgu w6dik w6dji w6dju
w6djj w6dlf w6dou w6dow w6drr w6drs w6des w6dur
w6dwa w6dyp w6dpl w6dew w6dep w6efn w6efs w6eg
w6egm w6ehd w6ehq w6eih w6eio w6eja w6eko w6enc w6em
w6eou w6epq w6epw w6erl w6err w6ets w6cup w6cut w6eve
w6evq w6ewj w6faw w6eyj w6fon w6feg w6ffl w6fgh w6fha
w6fif w6fan w6gq w6hij w6jir w6jt w6la w6lr w6lw w6oj
w6ot w6pb w6ro w6eb w6ai w6as w6tb w6uz w6ve w6wp
w6yah w6yb w6yo w6yp w6zza w7aas w7ads w7aem w7af
w7afs w7ait w7ame w7anp w7ao w7aoo w7awj w7apj
w7awi w7ayo w7bo w7bbv w7bil w7bir w7blr w7blw w7fb
w7fj w7gi w7gw w7ia w7ip w7jb w7kg w7kk w7lp w7mr
w7oe w7py w7uw w7ux w7wn w7yc w8alb w8alo w8ane
w8ats w8bbk w8bo w8bcj w8bjz w8caf w8cfq w8cna w8cta
w8dti w8ebn w8ecn w8sf w8uq w8sf w9aac w9abs w9aes
w9afl w9amv w9arn w9asm w9bge w9bjn w9bo w9bpm
w9bpr w9bq w9bre w9brr w9bek w9bxx w9ce w9clx w9cnf
w9cnj w9cno w9cow w9eru w9eya w9eyx w9dou w9duf
w9dkf w9dos w9dqd w9drq w9dae w9dti w9dza w9egd
w9ejd w9ems w9eru w9een w9eao w9faa w9fcy w9ffi w9fhr
w9fkg w9fkl w9fink w9fno w9fft w9fxq w9gij w9gdm w9gdw
w9gfk w9gzb w9ghk w9gho w9gij w9gkt w9gnt w9gu
w9gos w9gpu w9gu w9gus w9hpr w9hqh w9hrh w9hui
w9hwe w9hvz w9qi w9yl k5ab (qra) k4fbw g6wy k7af
hh1a lu1bm vk2je vk3rs vk3wz ct2aa on4dm ve4ba ve5b
ve4bj ve5aj ve5ai ce2aw x1d k6bcj k6eyw j1dr z13dn z13ki
ear21

W7QD, H. K. Larsen, 512 S. Second Ave., Sand-
point, Idaho

(7000-kc. band)

w2aup w4ajj w4gk w4kh w5aid w5aoo w5aqv w5bfp w5bts
w5bqt w5bts w5de w5lkt w5ux w5vv w6ael w6aem w6ag
(Continued on page 72)

THE COMMUNICATIONS DEPARTMENT

F. E. Handy, Communications Manager

E. L. Battey, Asst. Coms. Manager

Watch Your Note!

THOSE of you who still believe the monitoring stations are "just looking for off-frequency stations and pay no attention to r.a.c. and other antique notes" should "awaken"! K4RK was reported for using improperly filtered plate supply and was warned by the F. R. C. that a repetition would probably mean loss of his license! Take the tip. How is your note?

IDENTIFY EACH TRANSMISSION!

Attention is also called to the fact that a lot of amateurs are being "called" by the Radio Division monitoring stations for failure to sign station calls properly at the end of each transmission. (Par. 384 Regs., page 37, Jan. '32 QST.) The government observers are busy these days checking up illegal operation of all kinds, measuring frequency, and identifying unorthodox or irregular operation of all kinds. There is a valid reason why the government requires each station to identify each transmission correctly. It is not proper or permissible to omit the W or the numeral from any call as some amateurs have found out to their sorrow. Make sure you sign correctly at the end of each transmission. That will avoid possible trouble for you, and assist indirectly in the apprehension of those who commit more serious violations by speeding up station identification. Sign properly for each and every transmission!

LOG EACH CALL!

Further difficulties have resulted from improperly kept station logs. Paragraph 386 of the amateur regulations requires that an accurate log of each transmission be kept. Some stations have overlooked this regulation, or neglected careful compliance with it, and are likely to find themselves in deep water if their log should be called by the licensing authority for any reason following a monitoring period, b.e.l. interference difficulties, etc. Logs are required, by the regulations, to show all the following information accurately, "the frequency band," "the input power," "the station called," "the name of the operator" and "the date and time of each transmission." This means that a log of "stations worked" with a few other scanty details is n.g. Every "CQ" must be shown, and every call made, whether a station was contacted or not. Log each transmission!

From the "Cornhusker Catwhisker," the official organ of the Cornhusker Amateur Radio Association (affiliated), we learn that in the case of the revocation of station license cited for W9AJD (page 40, November 1931 QST), Dr. Miller made application for a hearing, and this case was subsequently brought up in the Federal Court in Lincoln, Nebraska. The jury in the case exonerated the licensee of the charges brought against him by the F. R. C. The station license, W9AJD, stands suspended for one year, however, by ruling of the Federal Radio Commission.

Quoting from the "Catwhisker," "Mr. Clearman, who represented the F. R. C. at the trial, made it quite clear that the Commission was appreciative of the value of amateur radio and the services rendered by amateurs, that the attitude of the Commission is not vindictive in its actions in enforcing the amateur regulations. The Commission believes that most amateurs are law-abiding gentlemen and, further, that complaints are caused by a relatively small proportion of amateur operators. The Commission feels that the re-

moval of a few 'bad actors' will materially strengthen the cause of amateur radio. Amateurs are expected to take care of their own problems, but the Commission when necessary must take prompt and decisive action to remedy conditions and see that proper regulations are enforced. It was made clear that the Commission does not desire to curtail the operation of any amateur station, but it expects, and rightfully, that the station will be operated legally, that it will not interfere with B.C.L.'s, that a log of every transmission will be kept, that the note will be d.c., that the station will observe frequency assignments with care. If there is no other way of enforcing these regulations then the Commission has no other choice but to close the station."

Canadian Stations Penalized

Unlawfully established station

ON THE 6th of November, 1931, an unlicensed amateur transmitter was found installed at the residence of Mike Tomiak, 1862 20th Ave., E., Vancouver. All equipment was seized and court proceedings taken against him. At the trial it was found that Tomiak was in exceptionally poor circumstances, and the case was, therefore, not pressed, the defendant being found guilty and given suspended sentence.

Disregard of written instructions

Interference to nearby broadcast receivers from the transmitter of the amateur station on Edward E. Thompson, 55 Lawrence Ave., W., Toronto, necessitated the Toronto Inspector instructing him by letter to refrain from operating his station during the hours of 6 p.m. to 11 p.m. daily, and in addition 10 a.m. to 2 p.m. on Sundays. Subsequently, Mr. Thompson was heard testing and calling an American amateur during the silent hours imposed on his station. The license issued to Mr. Thompson was suspended, and his transmitter ordered dismantled.

For operating an unlicensed station

Subsequent to the issuance of an amateur station license to Mr. W. H. Moore, 56 Hammersmith Ave., Toronto, it was found that he had unlawfully operated his station for some six weeks prior to applying for a station license, and had used the call sign VE3CK, which was already assigned to another amateur station. Mr. Moore's operator's license was suspended and his equipment ordered dismantled.

Moving Traffic Reliably

THE Detroit Traffic Committee, composed of members of the Detroit Amateur Radio Association, is doing very good work. At present there are 14 stations, two of which operate on some certain night of the week on schedules exclusively. When one of these stations finds it impossible to operate he notifies the chief of the group who assigns another for this evening. By all of them keeping on same frequency or very close to it is easy to contact 100% on all schedules and to make them mean something. The Association has authorized expenditure of such postage expense as is necessary to notify out of town schedule stations of changes and other miscellaneous items. Credit for the organization must be given to WSDYH, Ken Conroy, and W8FX, R. P. Thetreau, who have worked to get the group organized and running smoothly. With additional stations desiring to

enter the group, it is expected a third detail of seven will start schedules shortly. In this way, a station is only required to be on the air on one evening a week.

Sure fire schedules and exchange of traffic between local stations to facilitate speedy accurate handling, are made possible by such organization. We hope other radio clubs will study the Detroit plan and organize similar groups. Let's hear from you on this, clubs. In the fall we would like to see such groups offering reliable message service between all our cities of good size. Organization and cooperation will do it. How about your part?

ARTICLE CONTEST

We invite contributions on every phase of amateur communication activity. New ideas and viewpoints, criticisms of and remedies for conditions, hints on DX, suggestions concerning radio club organization, information on interference elimination, exceptional two-way communication work covering emergencies, athletic games and trips, timely attention to operating practice, commentary on the place of radio-telephony, experimenting or development work in present-day amateur radio, data on low-power possibilities, 1750-ke. operation, etc. all are needed. There is plenty of romance and real accomplishment in amateur work. Read these contributions. Then give us some real operating stories or the benefit of your views on different subjects.

In addition to publication of the best articles in QST, the author whose article appears to have greatest value of those received for consideration, has his choice of (1) a copy of *The Radio Amateur's Handbook* bound in leather cloth, (2) six pads of message blanks, or (3) six of the new type A.R.R.L. log books. This offer will continue until further notice. The articles presented herewith are the prize-winning articles for this month and last month when lack of space prevented publication.

— Communications Manager

Those Broad Notes

By Elmer Newell*

IN these days of crowded amateur bands, with many more licenses being issued daily, the desirability of having a clean, sharp signal is more important than ever. Everyone knows the congestion and QRM now existing on the amateur frequencies, most particularly in the 3.5- and 7-mc. bands, and much of this QRM is caused by broad rough notes, greedily appropriating many times as much space as that occupied by a nice sharp signal. There are notes on the air which sound like raw AC and which cover as much as fifteen times as much as the sharp signal. There is little choice between these notes and the power leak in the next block, and they are in direct opposition to the radio laws, but they are still there.

It seems also that the broader and rougher note some hams have, the longer time they hold the key down. How pleasant it is (?) to have someone, with a note like the last expiring gurgle of the bath tub on Saturday night, start holding down his key right on top of the distant friend who is giving you an important message. This air-hog gurgles and splutters and bleeps, and as this type usually keeps it up for hours, one might as well give up all hopes of copying that traffic. Add to this broad note a fist which CQs for minutes on end without signing once and you have a combination which may be relied upon to disrupt QSOs and ruin dispositions. Naturally, many of these notes are owned by new amateurs, who by reason of inexperience are

* W7AYM, 2416 Aberdeen Ave., Aberdeen, Wash.

not yet able to adjust their transmitters to the cleanest and sharpest note. But it is surprising how many hams who have been in the game long enough to know better, are some of the worst offenders.

We can't all afford crystal control with its clear sharp and easily-read note, but we can make some attempt to put out a signal which is steady and sharp. Instead of forcing that tube to the last drop of juice it will take without melting, why not reduce the power input to a more reasonable amount and clear up those signals? If every ham would be willing to try and get the sharpest and cleanest note possible with the equipment available, how much less QRM would be caused, and how pleasant that would be. Some sacrifice of output might be necessary but the clean note would more than compensate for this. Cooperation toward cleaner, sharper signals would be well worth while and beneficial to all.

Traffic Handling

By George Hart*

IT'S quite surprising to me to note the different number of ways that some of you fellows pound off the preamble of a message. Every blasted one of you, I am sure has, at some time seen an A.R.R.L. radiogram blank. You will notice that the first space is for city of origin. This includes only the city, and state. The idea of putting in the name, address, and QRA of the sender was used back in the spartan days. In other words, it's prehistoric.

After HR the city, station of origin, number and date should follow in quick order, without any decorations. Sending punctuation is a waste of time, besides being a means of confusion to a good operator. When a question mark is sent after a word, it means that the word will be repeated. Also, we should know that when a letter is spaced apart from the rest that it is an initial of some kind or other. "QUERY" may be used in place of a question mark, and "COMMA" should be sent instead of the punctuation mark. Do not use a double dash (---) to indicate periods in a radiogram! The word "STOP" is used for that exclusively.

All difficult names of persons, places or things should be repeated throughout the messages. It is saving of time to send it thus rather than to have the other station waste a lot of time later asking for a fill. Do not, however, QSX other words unless requested to do so by the receiving operator.

After the city of destination, --- should precede the text. At the end of the text, double dash should be similarly inserted before the signature. AR signifies the end of the message. One may turn off his transmitter and listen for an acknowledgment following AR W6 — (your station identification).

Below is an example of possible procedure in contacting a station and relaying a message:

W3NF, "CQ CQ CQ WEST DE W3NF W3NF W3NF CQ CQ CQ WEST DE W3NF W3NF W3NF ORS AR"

W9XXX (bearing, answers call), "W3NF W3NF W3NF DE W9XXX W9XXX W9XXX (etc.) K"

W3NF, "W9XXX DE W3NF R GE QSA 5 R7 HR IN EASTON PA QTC 1 QSP? AR W3NF K"

W9XXX, "W3NF DE W9XXX R TNX QSP ME W3XXX K"

W3NF, "W9XXX DE W3NF R HR EASTON PA W3NF 142 DEC 23 W6XYZ 1419 SOUTH HENRY STREET LOS ANGELES CALIF --- YOUR MESSAGE RECEIVED THANKS FOR SAME STOP PLEASE ADVISE YOUR OPERATING HOURS STOP LUCK AND 73 --- GEO W3NF AR QRU W3NF K W9XXX, "W3NF DE W9XXX 142 R QRU OSK GE 73 SK W9XXX"

W3NF, "R FB S U 73 SK W3NF GEO"

That is correct procedure. A systematic method of handling traffic, avoids the major difficulties and pitfalls some hams have in sending messages. Let's go, gang.

* W3NF, 300 N. Third St., Easton, Pa.

Battleships (Salvo)

By Frederick W. Mueller, W6EHO

THE following is a description of a game I have played over the air with a number of fellows. I think it might interest others. It is called "Battleships" or "Salvo," and is played by two at a time. Each player has a sheet of paper on which are two sets of squares (one to represent the opponent's territory, the other representing his own territory), one hundred squares in each, lettered horizontally from "A" to "J," and numbered vertically from 1 to 10.

Each player has four ships, a battleship, a cruiser, and two destroyers. These are placed on the squares so as not to be found by the other player. The battleship is placed by drawing

Player No. 1 (winner)

A	B	C	D	E	F	G	H	I	J
1	1	1	3	2	3				
2			4	2	3		7	1	
3				5		6	1		
4	3			1	3				
5			1	2	4				
6		2			4				
7				5	6	3			
8			2	4					
9	1								
10						7			2

Location of No. 1's ships (left) and effects of No. 2's shots. The numbers within the squares indicate in which "salvo" shots were made.

Player No. 2 (Loser)

A	B	C	D	E	F	G	H	I	J
1							5	3	1
2									
3		7	8	1					
4				4		2			
5		1	5	2		8	6	3	3
6		5	4	5	5	1	6	2	
7		2	4			4	3	4	
8									
9									
10							2		

Location of No. 2's ships (right) and effects of No. 1's shots. The numbers within the squares indicate in which "salvo" shots were made.

a straight line through four squares, either vertically, horizontally, or on an angle; just keep it in a straight line. The cruiser is placed similarly, but occupies only three squares. Destroyers require two squares each. Each squadron thus occupies eleven squares or secret vulnerable points.

The object of the game is to sink the ships of the other player. The battleship has three shots, the cruiser two shots, and each destroyer one shot (a total of seven shots each play or "salvo"). Player No. 1 keeps track of his shots at No. 2's squadron by indicating them in the set of squares which represent the opponent's territory, and transmits the shots to No. 2 by sending "1J," "5B," "0F," etc. (whatever they happen to be). The opposing player does not know, of course, where the enemy's ships are placed. Player No. 2 receives the shots from No. 1 and indicates them in the set of squares where his ships are located. If any of No. 1's shots hit any of No. 2's ships, No. 2 must advise which ship (destroyer, cruiser, etc.) is hit, but does not tell where (in which square or squares). This procedure is repeated by both players until one of the ships is "sunk" (a ship is sunk when the enemy has hit all squares in which it is located). When a ship is sunk the loser must deduct the number of shots for the particular type of ship it happens to be from his shots in each following play or salvo. Each player ordinarily has seven shots each salvo, but upon losing a ship he must forfeit the number of shots allowed that ship (battleship 3, cruiser 2, destroyer 1) in each following salvo.

The player who first sinks all four of his opponent's ships wins the game. The diagrams indicate approximately how a game is played, showing what each player has before him at the conclusion of "an engagement." In practice each player keeps two diagrams before him, showing his shots and the result of the enemy's salvos.

A nautical terminology helps much to make the game of "Salvo" or "Battleships" more interesting. Such phrases as "Your Salvo," "Got me in the cruiser," "I've got your range," and others add excitement to the game. Try a battle by amateur radio and let us know how you like it.

Traffic Briefs

The Delta Radio Association will hold a big hamfest in Monroe, La., on April 2nd and 3rd. All hams invited!!

The motor Vessel *Silver Wave* sailed from Vancouver, B. C., February 21st, with Cocos Island Treasure Hunting Expedition. The British Columbia Amateur Radio Association requests all amateurs to please listen for provisional call *TIFI* on 14, 7 and 3.5 mc., making contacts if possible. For QLSs address VE5FI at Vancouver, B. C.

Rho Epsilon Radio Fraternity, W7YH, located at the State College of Washington, is using the A.R.R.L. code lessons in a broadcast over station KWSC on 1220 kc., from 9:00 to 9:30 p.m., every Wednesday night. Anyone making use of the broadcasts is requested to write to either KWSC or to Rho Epsilon telling how he likes the lessons. Beginners within the range of KWSC should take advantage of this code practice.

Found! One Larry Dunnam, ex3ZY, old-timer supreme. W3CA hastens to advise that Larry is now signing W8EIK in Bluefield, W. Va., and will be tickled to QSO any of his old friends.

On February 16th a real Alaskan snowslide completely destroyed the Jumbo Mining Camp at Kennecott, location of K7BLI. The building in which the station was located was ground to pieces and buried under forty feet of snow. The operator, Al Domenico, was lucky to escape without injury, although one man was killed and several others severely injured.

A plane (call KH1YB) has been made available to the A.A.R.S., the Ninth Corps Area, for emergency use, by the Hancock Foundation College of Aeronautics, Santa Maria, Calif. In case of disaster KH1YB will fly over the stricken area keeping radio contact with Army amateurs, and forwarding information necessary for prompt and efficient relief measures.

VE1BV, Route Manager for Nova Scotia, won the Silver Trophy presented by C.H.N.S. to the most active Maritime amateur station throughout the year 1931. VE1BV submitted QSL cards to confirm 800 QSOs on the three popular bands, 3.5, 7 and 14 mc.

675 miles per watt is a record claimed by W9GIG, Lake Bluff, Ill., by virtue of a QSO with W2DEN, Nutley, N. J., a distance of 867 miles. GIG was using an input of 1.28 watts to a 212D (64 volts at 20 mills). Report received from W2DEN was QSA4 R6. Time of QSO was 8:15 p.m., CST. Frequency band — 3.5 mc. Other states worked with the same input are Arkansas, Illinois, Missouri, Iowa, Wisconsin, Indiana, Michigan, Ohio, Minnesota and Kentucky.

While looking for prospective hams in Vermont, SCM W1BD asked one if he were interested in amateur radio. The answer was staggering, and even disquieting, for it read thus: "I have never sold any, but have repaired several"!!! Truly, a ham doctor.

W7KG and W7AYP of Boise, Idaho, come forward to claim a new 'phone QSO Endurance Record. They were in continuous communication from 9:57 p.m. (Nov. 25) to 12:57 p.m. (Nov. 26), a total of 15 hours! See page IV, April 1931 *QST*, for other "QSO Endurance" records.

W6ERW announces the establishment of a California Chapter of the "Knights of the Kilocycles," an organization of 'phone enthusiasts. For complete data communicate with C. P. Ryan, W6ERW, 1037 42 Street, Sacramento, Calif.

What's in a name? "Plenty," says Bill Messerschmidt, W3BPX. He was QSO a chap who requested his name. He sent his last name only. "OK YL," was the comeback! The "monicker" had been copied "Miss E. R. Schmidt."

More 3.5 mc. DX: On January 18th Jim Lotysh (ex-3CFG), now operating W2DLL, attained a goal he had been striving at for years — a ZL QSO on "80 meters." The lucky contact was with ZL3CK at 6:30 a.m. And, further, he also heard ZL3AZ and ZL2AK. . . . W3AOO adds that on January 30th he heard ZL3AS QSA5 R5 at 6:00 a.m., E.S.T.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
KAIHR	345	364	972	1681
VE3GT	147	263	653	1063
W3CXL	78	114	836	1028
W6ALU	152	350	438	940
W8PP	35	34	856	925
W3WF	108	34	634	776
W8DD8	70	149	490	709
W9BNT	186	262	257	705
W9IU	390	45	234	669
W9HK	98	91	464	653
W8BMG	27	72	526	625
W5BML	19	108	488	615
W2BZZ	13	16	584	613
W3BWT	119	126	362	607
W9FAM	13	20	514	547
W9FO	370	49	108	527
W6ETJ	254	88	178	520
W1ASF	43	258	216	517
W5AOD	26	14	467	507
W9ACL	336	25	145	506
W9NP	29	312	80	421
W3CXM	47	186	174	407
VE3GX	46	105	240	391
W1BDI	109	104	158	371
W3MC	67	103	178	348
W6CFN	214	108	22	344
W6AMM	115	169	—	284
W8FX	25	118	116	259
W7TX	58	148	15	221
W9DRG	71	114	8	193
W9GAI	20	119	6	145
W6YL	31	104	3	138

Month of January 16th-February 15th. Note the stations responsible for above one hundred deliveries. Deliveries count!

A total of 500 or more *bona fide* messages handled and counted in accordance with A.R.R.L. practice, or just 100 or more deliveries will put you in line for a place in the B.P.L. Why not make more schedules with the reliable stations you hear and take steps to handle the traffic that will qualify you for B.P.L. membership also?

Traffic Briefs

For months W2ADQ has been keeping a daily schedule with K5AA, Canal Zone. The Department of Terrestrial Magnetism, Carnegie Institute, Washington, D. C., routes all traffic for their observatory at Huancayo, Peru, via W2ADQ-K5AA-OA4U. OA4U is located at the Peru Observatory. Seaton (W3BWL), operator at OA4U, tells of a nice bit of work on February 27th. With urgent message for Washington OA4U raised W8SL, who, after much difficulty due to weak signals, got the message and forwarded it to Washington via telegraph at 9:30 a.m. Reply was received at OA4U via W2ADQ-K5AA at 3:30 p.m., same date. This is but one example of the many splendid relays over the W2ADQ-K5AA-OA4U circuit.

O.R.S.—Attention!

DON'T forget the coming O.R.S. QSO Parties, scheduled quarterly during 1932. The air will ring with the "three times three" CQ ORS (general call) again the evenings of Saturday and Sunday:

April 23rd and April 24th
July 23rd and July 24th
October 22nd and October 23rd

Scores in the January Party will appear in next QST, and details showing where each Official Relay Station that took part was heard, covering all parts of the U.S.A. and Canada will appear with the full announcement of the April ORS-QSO Party in the mid-April ORS bulletin, mailed exclusively to A.R.R.L. Official Relay Stations, club and field organization officials. Rules for scoring will be the same as those given page 49, January, 1932, QST. Each party thus far has been bigger than its predecessor; mark the next opportunity — April 23rd-24th.

When you have traffic and want to find a reliable station for QSP, send a CQ ORS — give your messages to A.R.R.L. Official Relay Stations.

W3YD, Quantico, Va., made contact with Belize, British Honduras, at 1:00 a.m., September 13th, and received 11 messages. This is believed to be the second station to contact Belize the first night that they operated in the amateur bands to move emergency traffic.

On August 7th W9AHQ, Sioux City, Iowa, worked F3MTA (Martinique) on 14-mc. 'phone. F3MTA is using c.w. on about 14,400 kc. and wants to work all of the U.S. gang possible. He says to look for him between 7 and 9 p.m. E.S.T. W9AHQ has worked four continents on 14-mc. 'phone.

W6DFR reports over 150 members in the Ninth Corps Area, A.A.R.S., with many new members and most of the "old guard" "raring to go." The Ninth Corps challenged the Seventh Corps to show their stuff in the QSO Party held September 14th. The wager was corn against grapes. The winner will be made known when results are received from the office of the Chief Signal Officer.

W6FT is keeping a schedule with the Yacht *Vileeshi*, KGQS. Frequencies used mostly are 12,500 and 8200 kc., W6FT using the 7- and 14-mc. bands. The yacht is on a two-and-one-half-year cruise of the world and the operator, W6BPG, will be pleased to work as many amateurs as possible. The best time for contact with KGQS is about 8:15 p.m. P.S.T. W6FT will arrange schedules for anyone desiring special contact.

W9BNN, Heron Lake, Minn., uses two of the mileage-meter novelties given out by oil companies to their patrons to record his QSOs and QSLs. These devices run into a possible total of five figures, and it is a station routine at W9BNN to advance the meter a point with each QSO, or QSL. In 18½ months of activity he tallied 1800 QSOs and 540 QSLs. FB, W9BNN.

HIGH QUALITY SIGNALS

Send in your lists of High Quality Signals heard each month. We intend to resume publication of these lists as often as space limitations permit. Really high quality signals with the requisite sharpness, steadiness and clarity of tone, which meet our present-day requirements, are something we should all strive to obtain.

To "make" our list it is necessary that the signals be heard (by the individuals reporting) several different times and also reported to Headquarters from more than one source as proof of the consistency of the station and its regular use of a good signal. Of course stations with perfectly good signals must do a certain amount of operating to be generally heard and reported. Our lists thus credit both the outstandingly good signals and consistency or reliability.

All operators are invited to recommend small lists of (1) the outstandingly good signals (heard several different times) and (2) the well-operated stations consistently heard. The individual reports should classify stations heard according to different frequency bands.

Lists of Prehistoric Signals (a.e., broad rac, chopper, etc.) are also invited. As is the case with our High Quality lists, it is necessary that the stations with prehistoric signals be reported from more than one source before they will appear in the QST list. There is no excuse for an unnecessarily broad or out-of-date signal! High power enthusiasts should have a suitable filter before going on the air. Otherwise, they should remain on low or medium power out of consideration for other amateurs, and in respect of the regulation which specifies "adequately filtered d.c. plate supply."

During the period January 8th-22nd, the Southtown Amateur Radio Association of Chicago held two contests for its members. The first, a 14-mc. and 7-mc. DX contest, was won by W9AFN, who made a total of 256,000 points, working 9 countries. The second, the object of which was to work the greatest number of states on the 3500-kc. band, was won by W9DGZ. He worked 33 states, all on 'phone. The club plans to conduct similar contests in the future between meeting dates.

Relative Traffic Standings

(JANUARY-FEBRUARY)

Messages Per Station (25%)	Stations Reporting T.f.c. (25%)	Gain or Loss (T.f.c. Reports) (25%)	Traffic Total (25%)	Standing Based on Average of All Four Ratings %	Leading Section in Division
Delt. 74.9	Cent. 272	Mid. +18	Cent. 18391	Pacific 87.5	San Joaquin
Pac. 71.	Mid. 197	S. E. +11	Pac. 11857	Midwest 80.3	Iowa
Atl. 68.3	Pac. 167	Can. +8	Mid. 10293	Central 69.7	Michigan
R. Mt. 67.9	N. E. 146	Pac. -2	Atl. 9913	Canada 64.3	Ontario
Cent. 67.6	Atl. 145	Dak. -3	N. E. 8836	Atlantic 62.5	W. N. Y.
Can. 67.	N. W. 89	Delt. -3	Can. 5227	New England 60.7	Connecticut
W. G. 62.1	Dak. 81	R. Mt. -3	Dak. 3973	Dakota 55.4	So. Minn.
N. E. 60.5	Hud. 81	Roa. -4	Hud. 3547	Delta 50.	Arkansas
Mid. 52.2	Can. 78	N. E. -7	Roa. 3444	Roanoke 39.3	Virginia
Dak. 49.	Roa. 72	W. G. -8	W. G. 3419	Rocky Mt. 39.3	Colorado
Roa. 47.8	S. E. 63	Hud. -18	Hudson 3043	Hudson 37.5	E. New York
Hud. 43.7	W. G. 49	N. W. -22	Delt. 2698	West Gulf 35.7	No. Texas
N. W. 38.4	Delt. 36	Atl. -26	R. Mt. 1631	Northwest 33.9	Wash.
S. E. 23.4	R. Mt. 24	Cent. -41	S. E. 1479	Southeast 33.9	E. Florida

THE TEN HIGH SECTIONS

S. C. M

P. I. 279.5	Mo. 115	Mo. +11	Mich. 7347	Missouri 62.5	W9RR
Ariz. 145.5	Mich. 79	N. N. J. +9	Ill. 5502	Michigan 52.5	W8DMS
Nebr. 141.	Ill. 79	Mar. +9	Ohio 3695	Illinois 42.5	W9APY
N. Mex. 137.4	Ohio 56	Mid. + D. C. +8	Iowa 3478	Iowa 37.5	W9FFD
Alaska 118.1	L. A. 52	W. Fla. +8	Ont. 3128	Ohio 37.5	W8BAH
Ont. 100.9	Wash. 50	W. Mass. +7	Mo. 3121	N. New Jersey 30.	W2WR
Iowa 99.3	W. N. Y. 49	Iowa +7	W. N. Y. 2819	Ontario 27.5	VE3HB
E. Pa. 93.3	N. N. J. 44	Ala. +6	Ala. 2807	Philippines 25.	KA1SL
Mich. 93.	Va. 42	S. Tex. +5	E. Pa. 2801	W. New York 22.5	W8DSF
S. C. V. 88.4	Conn. 36	W. N. Y. +4	L. A. 2687	Arizona 22.5	W6BJF

1500 stations originated 19,406; delivered 16,040; relayed 32,305; total 87,751 (82.6% del.) (58.5 m.p.s.)

MISSOURI made the best all-around rating this month, and carries the Traffic Banner with 62.5 of a possible 100 points. For the second consecutive month Missouri also leads in number of stations reporting traffic. She even bettered her all-time high figure of 104 which she had last month. This month she has 115 stations reporting traffic, and has a greater gain in traffic reports over the previous month than any other Section. The M.P.S. and Traffic Total lists are led by the Philippines and Michigan respectively. Delivery percentage came up to 82.6 for the country.

The listings above show the relative standings of each Division and the ten highest Sections in (1) M.P.S., (2) stations reporting traffic, (3) gain or loss in traffic reports, (4) traffic total, and (5) average of all four ratings. The sixth column shows which Section led each Division, and gives the S.C.M. of each of the ten highest Sections in our whole field organization.

How does your section stand? If your section is not listed it indicates the need of more organized effort on the part of all stations within your territory. Work toward "making" all of the columns! Get busy and put your section at the top!

On February 6th W2BOQ, working in the 7-mc. band, contacted NEDC, the U. S. S. Hydrographer of the U. S. Coast and Geodetic Survey. NEDC was located at Norfolk, Va.

January 15th marked the close of the Northern Minnesota versus Southern Minnesota Traffic Competition, an event that was wholly successful. The work of each individual contestant made possible totals which carried Southern Minny on to new records, and enabled her to beat the Northern Section four times in a row. The prize winners: Grand prize, W9EPJ. Monthly prizes, W9EPJ, W9BN, W9BNN and W9BKK.

K7AIF, Bering Sea, was QSO W7AZQ, Seattle, and sent a message to BC station KJR requesting that a certain selection be played. In just three minutes from signing off, K7AIF's request number was coming into the shack, nearly 1800 miles away!

Quoting from a report of the A.A.R.S., Seventh Corps Area: "The 3500-kc. band appears to be entirely useless after dark, and skip distance effect has become definitely and thoroughly present. Even at 600 miles, communication is practically impossible. The 7th Corps Area Net is rapidly transferring to 1750 kc., and very little intra-Corps work is done on 3500 kc., and this before dark."

VK5HG will gladly send QSL cards to all amateurs who have not received one of his for QSOs held. He has received several complaints of cards being lost in transit, and wants every ham he has worked to get the card he has promised him.

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a Section, the present incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in Hartford on or before noon of the dates specified.

Due to a resignation in the Georgia-South Carolina-Cuba-Isle of Pines-Porto Rico-Virgin Islands and Oklahoma Sections, nominating petitions are hereby solicited for the office of Section Communications Manager in these sections and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, April 15, 1932.

Section	Closing Date	Present SCM	Present Term of Office Ends
Ga.-S. C.-Cuba-Isle of Pines-Virgin Islands	Apr. 15, 1932	J. C. Hagler, Jr. (resigned)
Oklahoma	Apr. 15, 1932	William J. Gentry (resigned)
North Dakota	Apr. 15, 1932	Guy L. Ottlinger	Apr. 25, 1932
Nevada	May 5, 1932	Keston L. Ramsey	May 15, 1932
Saskatchewan*	May 5, 1932	W. J. Pickering	May 15, 1932
Wisconsin	June 15, 1932	C. N. Crapo	July 1, 1932
Western	June 15, 1932	Robert Lloyd	July 1, 1932
Pennsylvania	June 15, 1932	Leo R. Peloquin	July 1, 1932
Massachusetts	June 15, 1932	Frank J. Quement	July 1, 1932
Santa Clara Valley	June 15, 1932	V. W. Hodge	July 1, 1932
New Hampshire	June 15, 1932	L. B. Lazure	July 1, 1932
Missouri	June 15, 1932	Fred J. Hinds	July 1, 1932
Illinois	June 15, 1932	S. C. Wallace	July 1, 1932
Nebraska	June 15, 1932		

To all A.R.R.L. Members residing in the Sections listed:

1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager, for the next two-year term of

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian General Manager, Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

office is about to be held in each of these Sections in accordance with the provisions of By-laws, 5, 6, 7, and 8.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed from Headquarters will list the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing date specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)

Communications Manager, A.R.R.L.

38 La Salle Road, West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the Section of the Division hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)

The candidates and five or more signers must be League members in good standing or the petition will be thrown out as invalid. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit of the number of petitions that may be filed, but no member shall sign more than one such petition.

4. Members are urged to take initiative immediately, filing petitions for the officials for each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

— F. E. Handy, Communications Manager

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections on or before the closing dates that had been announced for receipt of such petitions. As provided by our Constitution and By-Laws, when but one candidate is named in one or more valid nominating petitions this candidate shall be declared elected. Accordingly election certificates have been mailed to the following officials, the term of office starting on the date given.

Quebec	Alphy Blais, VE2AC	Jan. 21, 1932
Louisiana	Frank M. Watts, Jr., W5WF	Jan. 21, 1932
Alaska	Richard J. Fox, K7FQ	Feb. 16, 1932
Philippines	I. S. Liner, KA1SL	Feb. 16, 1932

In the East Bay Section of the Pacific Division S. C. Houston, W6ZM; S. G. Culver, W6AN and Herbert L. Bassett, W6HBB were nominated. Mr. Houston received 34 votes, Mr. Culver 25 votes and Mr. Bassett 20 votes. Mr. Houston's term of office began February 18, 1932.

In the Montana Section of the Northwestern Division O. W. Viers, W7AAT; Allen E. Richmond, W7AHF and John E. Parker, W7CG were nominated. Mr. Viers received 19 votes, Mr. Richmond 13 votes and Mr. Parker 11 votes. Mr. Viers' term of office began February 18, 1932.

In the Alberta Section of the Vanalta Division C. H. Harris, VE4HM and James J. Smalley, Jr., VE4GD were nominated. Mr. Harris received 25 votes and Mr. Smalley 24 votes. Mr. Harris' term of office began February 18, 1932.

Official Broadcasting Stations

(CHANGES AND ADDITIONS)

Local Standard Time	
W3BAK	3665 kc. Mon., Wed., Fri., 7:00 p.m.; Sun., 3:00 p.m.
W3WJ	3508 kc. Mon., Wed., Sun., 2:30 p.m.
W4UW-W5NO	7200 kc. Mon., Wed., 7:30 p.m.; Wed., 2:15 p.m.; Fri., 10:30 a.m. and 12:30 a.m.
W6ALU	7200 kc. Daily except Sun., 5:15 a.m. Sunday 9:30 a.m.
W6AXM	7250 kc. Tues., Thurs., Sat., 2:00 p.m. and 7:00 p.m. Sun., 2:00 p.m., 4:00 p.m., 6:00 p.m.
W6BRI	7018 kc. (cc) Daily except Sun., 1:30 p.m.
W6EJC	7042 kc. Wed., Sun., 7:00 p.m.
W6ON	3640 kc. Sked with W6BLS daily at 11:30 a.m. and Mon., 5:00 p.m.
W8AGS	3930 kc. Daily except Mon., and Fri., 7:30 p.m.
W8DBY	7140 kc. (cc) Mon., Thurs., Sat., 7:30 p.m.
W8DED	3825 kc. Wed., 9:00 p.m.; Sun., 7:30 p.m.
W8NW	7150 kc. Sun., Tues., Thurs., Sat., 10:45 p.m.
W8WAB	3700 kc. Mon., Wed., Fri., 10:45 p.m.
W8WAB	1800 kc. Mon., Thurs., 7:00 p.m.

DIVISIONAL REPORTS

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jack Wagenseller, W3GS-W3BF — W3NF again leads the Section closely followed by W3MC. W3OK takes third place.

W3UX has several very fine schedules. W3BEY is sure stepping out. W3AHD continues his fine work. One Sunday afternoon a gang of hams dropped in and entirely rebuilt W3AKB's outfit. W8CFI says QSP service is terrible. W3MG built a dynatron. W3ANK's totals are improving every month. W8CVS is very active. W3AFE joined the A.R.R.L. The Navy Net takes up all of W3AQN's time. W8FCB complains of bad skip on 3.5 mc. W3BUH reports more this time. W3BTP has no trouble getting traffic since he made schedules. W8VD is going to try crystal. W8AFV and the Scranton gang are all going to try 56 mc. W3ANZ worked K5AA on 3.5 mc. W3BCD reports. W3UB has been looking for a job. W3DZ reports an A.C. receiver. W3EO found 7 mc. NG for traffic. W3BBK has been QRT due to license renewal delay. W3NA has been building a new rig. W3CBK is building an MOPA. The ORS certificates of W8AWO, W8DHT, and W8CWO are all on ice. W8DPQ says the gang up his way are all trying 56 mc. ORS are supposed to be reliable, dependable, and operated in such a manner as to set a standard for all other stations to follow. We are going to check up on every ORS and see how well he meets the requirements, so watch your step, OMs.

Traffic: W3NF 435, W3MC 348, W3OK 238, W3UX 163, W3BEY 155, W3AHD 144, W3AAD 138, W3ATN 138, W3AKB 131, W8CFI 121, W3MG 103, W3ANK 82, W8CVS 71, W3AFE 58, W3AQN 55, W8FCB 49, W3BUH 47, W3BTP 45, W8VD 38, W8AFV 37, W3ANZ 35, W3BCD 31, W3UB 28, W3DZ 21, W3EO 19, W3BBK 17, W3NA 13, W3CBK 12, W8CWO 10, W8DPQ 19.

WESTERN NEW YORK — SCM, Don Farrell, W8DPS — No one in the Section seems able to beat W8DBX, who turns in the highest traffic total. W8QL is doing nice work. W8DSS ran several broadcasts regarding quiet hours during the DX tests. W8DHU goes on 7 mc. between 3.5-mc. schedules. W8DES has a good total. W8AGS is having trouble with receivers. W8AED and W8BQJ are new ORS. W8DSP has schedules with his Route Managers. W8DQP is running a lot of schedules. W8EUY has push-pull MOPA on 3.5 mc. W8BWY and W8BHK are QRL business. W8DXF reports that W8FUB is a new ham in Lookport. W8CPC keeps a regular schedule with W5AEE. W8BR is helping three new hams get on the air. W8BEN is working nice DX on 7 mc. W8DHQ is building another superhet. W8DME will be glad when the 'phones move to high-frequency end of 3.5-mc. band. W8CMW is planning a trip west. Marge of W8DEJ attended the Olympics at Lake Placid. W8AYM has push-pull 45e on 3.5 mc. W8CSW is conducting television tests with W1BCR. W8BFG reports DX fair. W8AFY worked NEDC. W8AFM is still in the process of rebuilding. W8DEQ has been sick. W8DMH is experimenting with 56 mc. W8AJ is opening a radio school on March 1st. W8DII keeps a Sunday schedule with W8DSS. W8BLP works his regular amount of foreigners. W8QB took traffic from CM2JT and gave him an answer in ten minutes. W8BLH can't get out at all at night. W8BGN is putting in crystal. W8CYG is handling traffic. W8GAH is a new ham in Utica. W8DMJ has a new MOPA. W8BFF wants ORS. W8AOR wants schedules with Vermont. W8CSE is changing his QRA from Camillus to Tully. W8AYD has his first class license. W8EMW handled important traffic for China. W8FOL reports for the first time. W8JV has started handling traffic. W8AN reports. W8GAI and W8GBV are new stations in Syracuse. W8ERZ reports from Auburn. W8ZZE is using his portable transmitter at Rensselaer Polytechnic Institute in Troy. W8CIL has been working on his power supply. W8AKX says someone is using his call letters. W8ETH reports for the north country gang. W8EDA is the proud owner of a new '03A. W8DHB has a new receiver. W8AXE is established at his new QRA. Ex-W8ATW is coming back with a new call. W8EDD is now in Potadam. W8EWE, the Foster Bros., are using push-pull 10s. There's a new radio club at Malone. W8DEB and W8EDD visited the Ogdensburg gang. W8AWM says new hams in Jamestown are thicker than mud. W8AWX is an old-timer. W8EWT has a fine traffic total. Let's help the section by all reporting on time.

Traffic: W8DBX 364, W8QL 351, W8DSS 253, W8DHU 237, W8DES 158, W8AGS 141, W8AED 114, W8DSP 100, W8DQP 68, W8BQJ 63, W8EUY 43, W8BWY 42, W8DXF

20, W8CPC 33, W8BR 25, W8BEN 23, W8DHQ 18, W8DME 16, W8CMW 15, W8DEJ 15, W8DSA 13, W8AYM 13, W8CSW 10, W8BFG 7, W8AFY 7, W8AFM 7, W8DEQ 7, W8CMH 7, W8AJ 5, W8DII 5, W8BHK 4, W8BLP 4, W8QB 2, W8BLH 1, W8EWT 265, W8CYC 77, W8DMJ 40, W8ERZ 39, W8BFF 36, W8AOR 32, W8GQ 20, W8CSE 20, W8AYD 18, W8EMW 16, W8FOL 13, W8JV 11, W8AN 12, W8TM 6, W8AKX 4.

SOUTHERN NEW JERSEY — SCM, Robert Adams, 3rd. W3SM — W3QL passed the Commercial Examination. W3PC is working for ORS. W3APN maintained several foreign schedules. W3ASG finds new QTH very good. W3ARN kept seven schedules weekly. W3AEJ sent in a nice report. W3BEI has been busy with 'phone. W3ACJ reports W3CGY is a newcomer. W3ZI had the second highest score in the National Army Amateur QSO Contest. W3BPD is keeping Salem County on the map. W3AUI is looking for traffic. W3JL reports local gang working on 56 mc. W3BBD had highest total since being appointed. W3BKP sent his first report. W3KW is working on television. W3SM now has 250 watts. The South Jersey Radio Association participated in the Washington Birthday tests on 56 mc. under the supervision of the State Fire Warden.

Traffic: W3BBD 124, W3ZI 10, W3QL 154, W3KW 25, W3JL 24, W3BEI 10, W3ARN 83, W3PC 29, W3AUI 11, W3AEJ 34, W3ASG 14, W3SM 28, W3BPD 7, W3BKP 8, W3APN 31.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Harry Ginsberg, W3NY — Many thanks for the splendid and gratifying cooperation you fellows are giving me in reporting. Thirty-nine stations sent in reports! Twenty-eight out of thirty ORS reported; and — here it is: **ELEVEN NON-ORS SENT IN REPORTS!** Here is the gang that is showing the real ham spirit: W3HT, W3AHT, W3ADO, W3AVD, W3CDG, W3AHA, W3BCS, W3WI, W3NR, W3BRS and W3BTJ. You non-ORS belong in the ORS line-up. What say? Send in those applications. W3NR is a welcome addition to the ORS gang. W3BAK and W3WI are newcomers to the OBS ranks. W3WI is our first 'phone OBS. Members of the Washington Radio Club are giving talks at their meetings, bringing their home-made apparatus to illustrate. The Westminster Amateur Radio Club — W3ALV, W3BOR, W3BOA, W3CDG, W3CAC, W3BRS — meet every Friday night at W3BRS's shack. RM W3VJ has quite a few cooperative replies to his questionnaire apropos his Eastern Shore Traffic Loop. W3DG has four members in his code class, held every Tuesday night at the SCM's shack. Beginners are sure welcome. Maryland: W3AOO leads the Md. gang. Bob Forrest, 2nd op. at W3BND, worked a YL on his first QSO. Hi. W3SN maintains daily schedules. W3CDG is having trouble to get the rig on 7 mc. W3BGI is kept busy chasing "bugs" in the receiver. W3BBW is doing his bit during the afternoons. W3ADO has two hours open for traffic each afternoon. W3BKC will take traffic for local QSP. W3AFF is moving into a new shack. W3BOE lost his second op, "Al." W3ZD is new call for W3BEG at Chevy Chase. W3AVD finds hum very disturbing in his AC receiver experiments. W3HT blew up everything "blowable." W3AHT will be ORS as soon as monitor is done. W3BRS reports for the Westminster Amateur Radio Club. W3BCS is getting out FB. W3LA promises some traffic. W3ZK is grinding crystals and making crystal holders. W3DG is testing on 3.5 mc. W3NY stands daily watch on 3600 kc. from 6:30 to 6:45 p.m. W3AHA is our popular local 'phone and CW station. W3BAT is out on temporary suspension to rebuild. District of Columbia: W3CXL leads the Section. W3BWT doesn't let the 'phone rig hurt his traffic total. W3ASO is sure out for BPL. W3CAB has been very busy. W3PN was on a few scattered hours. W3NR does his work mostly during the daytime. W3IL pounded out a few. W3BTJ will be ORS soon. W3PM is going in for higher power and lower frequency. W3CDQ has been ill. W3AKR is out on temporary suspension. Delaware: W3BAK is sure out for traffic to boost the Shore. W3HC reports plenty new stations up his way. W3WI is doing OBS work with a FB crystal 'phone. W3AJH says "nil hr, OM." W3ALQ is still visiting around.

Traffic: W3CXL 1028, W3BWT 607, W3ASO 371, W3AOO 147, W3BND 54, W3SN 54, W3CDG 23, W3BGI

19, W3BBW 19, W3CAB 15, W3BAK 14, W3ADO 14, W3BKC 14, W3PN 12, W3NR 11, W3HC 11, W3IL 9, W3AFF 8, W3BOE 8, W3ZD 7, W3AVD 7, W3HT 6, W3WI 5, W3AHT 5, W3BRS 5, W3BTJ 4, W3AJH 2, W3BCS 2, W3NY 2, W3ALQ 1, W3AHA 1.

WESTERN PENNSYLVANIA — SCM, R. M. Lloyd, W8CFR — W8CUG on trunk lines A and 2A leads the Section this month. W8YA turned in the highest delivery total, and, therefore, captures the three log books. W8YA also announces a Rag-Chew Contest; the conditions to be printed in May QST. W8DZP says traffic is scarce! W8DML makes his first report. W8DXI says W8AQY has a 250-watt on 3.5 mc. W8FKU is keeping schedules. W8CQA is building a new receiver. W8AJU has to get a new 50-watt to replace the deceased. W8BUC uses tuned coupling in his MOPA. W8CMP has four pentodes in his three stage transmitter! W8DLG says, "Rebuilding." W8KD is winding a transformer. W8BSE changed his course at school. W8AJE is trying for Trunk Line Station Certificate. W8BSO is buying furniture instead of radio! W8CPE and W8CSE are on 1750 kc. W8FGY says his new receiver is a "knock-out." W8AVY has a new transmitter. W8APQ has drifted toward the clutches of the dreaded foe of traffic — YLs. W8ABS and W8CGY are new applicants for ORS. W8DKL has a new antenna system. W8ECH sends the news from Waynesburg; he and W8CAF are after DX while W8DDU is working on 1750 kc.; W8FFR and W8BFZ are active, too. W8EEC got lost among the 200 or so hams who took their exam in Pittsburgh; he had to leave before the RI got to him.

Traffic: W8CUG 310, W8YA 250, W8DZP 119, W8DML 63, W8DXI 62, W8FKU 58, W8CQA 48, W8AJU 46, W8BUC 43, W8CMP 43, W8DLG 39, W8KD 37, W8AJE 30, W8BSO 16, W8CPE 14, W8CSE 10, W8ECH 9, W8FGY 6, W8AVY 3, W8APQ 1.

CENTRAL DIVISION

ILLINOIS — SCM, F. J. Hinds, W9APY — RM E. A. Hubbell, W9ERU — Congratulations, gang, on taking the traffic banner for Illinois last month! Let's do it again! W9EMN has a new MOPA. W9AFN is experimenting. W9AVB worked all W districts in the 'phone Chain QSO Party. W9BIR worked Spain. W9BYZ works a little DX. W9CZL made a change in his feeder system. W9FO handled Radio Show and Shanghai cable messages. W9CN is building AC receiver. W9NN has difficulty operating the crystal osc. and amp. from same MG. W9CSS is now a first commercial. W9DJ is now in Elmhurst. W9EGD worked EAR and PY on 7 mc. W9ARN worked 33 VKs in three months with '10s in CC. W9FHR's rig doesn't act like the book says it should. W9FXZ took an emergency message from GCASL (a Canadian Airways plane) and telegraphed it to Winnipeg. W9CKM has been on the sick list. W9GIV is looking for schedules. W9HSG handled messages for S. S. Lexington. W9FOE is a new ham in Beecher. W9HPQ is changing QRAs. W9HOS is building a crystal rig. W9CFQ is with us again. W9AJ handled some traffic between exams at U. of I. W9GGD is putting on 50 watts crystal. W9ESN has new 7000-volt transformer. W9ABS has been making field strength tests near Quincy. W9BEF worked several VKs and SM7RV. W9BPU has rebuilt. W9HYI is doing fine traffic work. W9ERU has a dandy crystal rig. W9BNO uses a 211-D. W9CZB is a new man. W9FFQ worked ZS6Y on 14 mc. W9GKI has a new receiver. W9AXM is rebuilding to MOPA. W9FYZ has a fine set of traffic schedules. W9HUX is now proud owner of a "Green" ticket. W9CTP is building new transmitter. The '01-A at W9DBO is working out well. New Push-Pull 50-watt set at W9FJB. A new TNT Push-Pull is planned at W9HPK. W9AAV is experimenting with grid modulation. W9AE uses class B mod. W9AAQ is portable of W9ANQ. W9BBR hits England with his 3.5-mc. 'phone. W9EPU has new antenna. W9ETU gets out fine on 'phone. W9FOW is portable call of W9DEU. W9EGY has a new low powered PP trans. W9GIG has a replacement on the blown 800-watt transformer. The big 'phone set at W9GYK is knocking 'em dead. W9CFV is building a new PP MOPA. W9GDI now sports a "Blue" ticket. W9BRX is making improvements. W9JO borrowed W9HCI's National receiver for the DX tests. W9AZW uses MOPA. W9BJZ, W9ATJ and W9AKS use

TNT circuits. Crystal now at W9BSR. W9FGD has worked 300 stations since first of the year. W9ACU uses a crystal fed direct to antenna. The new crystal is finally perking at W9VS. W9PK now has 250 watts input. W9GFU does fine 00 work. W9DOU is moving to 1750 kc. The Egyptian Radio Club has a QSO Contest on with a loving cup for the winner. W9HNC is new ORS. W5LB is now in Illinois. W9HFK is fooling around with circuits. W9ALA worked K5AA on 14 mc. W9GYO is using a bug now. W9ACE is starting a radio station at Junior College. W9DZU is experimenting with AC receivers. W9GAI has second-class commercial and W9FFI call. W9RO uses 211-E with crystal. W9ATS was ill for a week. W9AYO is crystal-controlled on 3500. W9CSB is now an A.A.R.S. W9FXE has new receiver. W9FAU is on with a pair of '10s. W9CUX has a transmitter for each of the three popular bands. The '52 went west at W9EJO.

Traffic: W9IU 669, W9FO 527, W9FAU 347, W9ERU 301, W9BPU 263, W9FXE 253, W9ABS 245, W9HSG 238, W9FYZ 236, W9FGD 208, W9AYO 164, W9CGV 180, W9GAI 145, W9ATS 133, W9BYZ 132, W9ACU 106, W9VS 102, W9APY 90, W9DZU 70, W9OQ 74, W9GYO 67, W9AMO 66, W9HFK 60, W9AD 49, W9DOU 44, W9HYI 44, W9GFU 42, W9CZL 39, W9AFN 36, W9HNC 33, W9HPK 32, W9CEO 31, W9CFV 29, W9PK 27, W9FRA 26, W9BTU 24, W9GEP 24, W9FDQ 23, W9WR 22, W9BSR 21, W9DBO 20, W9CSB 19, W9FXZ 19, W9ACE 17, W9ABB 17, W9FJB 17, W9ALA 16, W9CUH 16, W9HUX 15, W9DJD 13, W9BVP 12, W9CFQ 11, W9CUX 11, W9NN 8, W9AJ 7, W9JO 7, W9BRX 6, W9GIV 6, W9HOS 6, W9AXM 5, W9CKM 5, W9DAP 5, W9EMN 5, W9BIR 4, W9HZB 4, W9GDI 3, W9CN 2, W9CTP 2, W9FPN 1, W9RO 1.

INDIANA — SCM, George Graue, W9BKJ — this report is written by W9CVX. Our sympathies go to our SCM in the passing of his mother. W9CHA will be on with crystal shortly. W9BZF uses his OW for 'phone CQ bait. W9DJP's power supply is temporarily indisposed. W9AB is a new OBS. W9ESH is on with a 3910-kc. crystal rig. St. Joseph Valley Club puts on inter club QSO party. W9CKV, W9EXL, and W9AB have 56-mc. rigs. W9DWN reports two '52s kicking out. W9HZH has applied for ORS. W9FXO has new a.c. receiver. W9EZR enters into the "depression eliminating spirit" and buys two '10s. W9FXM gets fine reports. W9BZZ, W9EWQ and W8BZN are ops at WPDH. W9HKZ snags some foreign DX. W9FHB is still cursing his crystal. W9CKY reports DX on 7 mc. W9BDE has installed a class "B" modulated 'phone. W9AMI is back from Valpo. W9CRD is a new ham in Frankford. W9BKJ is QRL making crystals. W9BWI and W9CLF have televisionists. W9ETH is back on CW. W9DBJ has rebuilt for 14 mc. W9BHM has some BCL trouble. W9CVX and W9AET are busy at WOWO. W9AAI and W9AZC have remote control feature service. W9ETH is still trying to pronounce his call. Ex9AVB has been etung again by the ham bug.

Traffic: W9YB 142, W9FUT 104, W9GGJ 58, W9TE 38, W9GJS 48, W9BXT 40, W9DHJ 28, W9FHB 17, W9AXH 14, W9EXL 8, W9EGE 5, W9BOS 4, W9GYB 2, W9FYB 1, W9AKJ 23, W9DZJ 38, W9HCU 25, W9AB 7.

MICHIGAN — SCM, Ralph J. Stephenson, W8DMS — This is the biggest month in point of reporting stations and we can thank the "Bull" put out to all reporting stations by W8DYH and W8FX for the showing. W8PP leads the Section. The other four RMs have high totals, too!! W9HSQ pounds 'em out with a home-made bug. W8DYH now has his yellow ticket. W8BIU and W8WR changed QRA. W8FIO is promoting hamfest at Watervliet. W8EKZ bows his head to old man "skip" on DARA schedules. W8EGI is helping beginners. W8AYO was reported in Russia on 56 mc. W9VL helped get W9GJX on the air again. W8DZ helps the RMs in their secretarial work. W8DU finds little time to get on. W8CEU's power supply blew up. W8AM is playing with 3.5-mc. DX. W9HK reports for the gang up in the U.P. W9DY is ready to go with half k.w. crystal. W9CSI's 75 watts are working perfectly. W9DUE is QRL school. W9EGF keeps the copper country bunch pepped up, and W9CWR takes care of the west end of the U.P. W8PQ is new ORS. W8DVO is back on the air. W8LU is busy getting two new hams started. W8BJX

spends lotsa time copying code on a mill. W8D out in Kalamazoo. W8DWB reports from Grand W8AIU says his crystal is nervous and jumpy. W8AT is 100% 'phoney. W8DFS experimented with antenna. W8BTK keeps the Wayne gang interested. W8FX has discontinued DARA Net No. 3. W8QT reports from Mpskegon. W8DMY is new station there. W8AYO is rebuilding using pentodes. W8CST and W8HL keep A.A. work up in Detroit. W8PP has more transmitters than most of us have burned-out tubes. W8DM is building transmitter with commercial appearance. W8MZ keeps Royal Oak on the map. W8HIS says transmitter needs fixing up. W8MV is looking for power supply, crystal, etc. W9CE is disgusted with 14 mc. W9BBP handles W9VL's schedules at times. W9GQF keeps reliable schedules. W8DSX questions whether four messages is worth reporting. Sure, we want 'em all! W8GP is QRL 14 hours daily on job. W9FBC is experimenting with BC converters. W8CPH is helping W8FIO with hamfest. W8BJT is having trouble with bugs in his crystal. W8DED pries a report from W8DQV. W8EGX is sold on the idea of tube keying. W9CWR's total suffered because of transmitter troubles and WX. W9CEX is our only outlet to Dollar Bay. W8EVC W8AZQ and W9DAB are in line for ORS. W8PQ gets his this month. The Western Michigan gang staged a miniature hamfest, with W8WVN winning the grand prize, a shorted fixed condenser, delivered to him in a piano box. W8ETP is a new traffic prospect. W8AE is changing QRA. W8BMG gets covered up with those new-fashioned "splash type a.c." notes. W8CFM uses MOPA. W8CFZ inquires about ORS. For benefit of non-ORS, we require at least four consecutive reports before applicant is eligible. At the time of fourth report, call it to the SCM's attention. W8DCT keeps busy on AA work. W8CTH sends in his first report. W9EEN is a new reporter via W9EGF. W8BGY is our Lansing stand-by. W9FSK is building A.C. receiver. W9EXT sends us a nice letter. Most of the gang seem pleased with the "Bull" so for the information of non-reporters here's what it is: It's a mimeographed SCM-RM letter put out by the DARA containing ALL the Michigan news, schedules, etc. and sent to only those stations sending in a monthly report on traffic. Comprez? Let's have the reports and we will do the rest. Reports from W8AKN, W8JX, and W8FIO just get under the wire. W8FIO is new station at Watervliet.

Traffic: W8PP 925, W9HK 653, W8BMG 625, W8DYH 412, W8DED 304, W8FX 259, W8PQ 234, W8AM 220, W9CE 220, W8CPH 214, W9EGF 210, W9VL 186, W8EE 170, W8EGI 156, W8DFS 144, W8AW 143, W8RP 137, W8CEU 130, W8QT 116, W9BBP 108, W8CST 107, W8BTK 99, W9YX 92, W8EVC 89, W8CFZ 77, W9CWR 75, W8JX 62, W8CWK 60, W8DZ 60, W8BMZ 59, W8DC 58, W8AZQ 54, W9DAB 54, W8AKN 53, W9EXT 53, W8RF 43, W8AIU 40, W8DMS 38, W8ARR 37, W9CSH 36, W8DOS 34, W8WBW 34, W8DEH 32, W9GQF 31, W8EE 28, W8GP 27, W9FBC 22, W8CJZ 21, W8CFM 21, W8DE 20, W8BGY 18, W8AYO 17, W8BXJ 17, W9HIS 17, W8DVO 14, W8BJT 14, W8PY 14, W8CJQ 13, W8FIO 13, W8DWB 12, W9HSQ 12, W9CEX 11, W8FTW 10, W8AM 10, W8DU 9, W8EGX 9, W8WR 9, W8BUH 8, W8CTH 8, W8BIU 5, W8DVO 5, W8DSX 4, W8ATO 3, W8CAT 3, W9EEM 3, W8AUT 2, W8ETP 2, W8LU 1, W8DM 1.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9AV has been appointed Route Manager for Southeastern Wisconsin. W9ZY hit the high mark for this season. W9GF worked all states and provinces. W9FSS handled traffic Chicago Radio Show. W9GVL is trying out 56 mc. W9A schedules W9GPQ, W9BN and W9BRR. W9DKA reports via radio. W9LV is building new job. W9BJF-W9BQ blew a pair of 211s. W9ARE has crystal. W9FAA has schedules with W9EPJ and W9GPQ. W9GPQ is keeping this moving in Eau Claire. W9HTZ wants schedules. W9HM says things fine on 3865 kc. W9ZZN gets a kick out of checker games with W8SO. W9HFA and W9CJU are first reports. W9DRO works CW all bands. W9EHD building low power 'phone. W9FAF has MOPA. W9BE has 3900-kc. Zepp. W9SO has schedules with W9ZZN at W8FYN. W9CFP has new monitor. W9ASQ keeps at one schedule — W9HTZ. W9DJA was not on much. W9AMR is new station at Lacrosse. W9BIB attends

Club, February 18th, with AVG, AFU and EEF. says no luck with MOPA. Reports received from following: W9IH, W9EOB, W9GIR-FHU, W9GYQ, W9EAR, W9EGP, W9AUG and W9HYM.

Traffic: W9ZY 175, W9GFL 131, W9FSS 91, W9GVL 52, W9AN 4, W9DKA 40, W9LV 38, W9BJF-BQM 36, W9ARI 27, W9FAA 26, W9GPQ 21, W9HTZ 19, W9HMS 19, W9ZAN-HJY 18, W9HFA 17, W9DRO 17, W9EHD 15, W9CJU 13, W9FAF 12, W9ESZ 11, W9SO 7, W9CFP 6, W9ASQ 6, W9DJA 4, W9AMR 3, W9BIB 2, W9DKH 1, W9VSD 32.

OHIO — SCM, Harry A. Tummonds, W8BAH — This report is being written by W8DDS. The SCM is very QRL. The Ohio gang is all pepped up after the ORS meeting held at Cleveland, February 21st. W8DDS represents Ohio in the BPL District No. 1: W8DVL is coming on with crystal. W8BYD is 'marin' to go. W8BMX has nice total. W8RN is knocking 'em out on 7 mc. W8BOT will have better total next month. W8EXA is experimenting with Pentodes. W8CCK is awaiting a dynamotor. W8CIY schedules OXYE. W8AXV will soon have 250-watt crystal. W8BNC is working 14-mc. 'phone DX. W8EBT is rebuilding at about every station in town. W8CIO is busy with OO work. W8CRB is new ORS. W8FF is going strong. W8BON has new Hartley. W8EEW was off air. W8BFT wants schedules on 3.5 mc. W8FGC will want schedules soon. W8EFW is busy with 1750 kc. W8EQU, we want your total, no matter how low it is. W8EBY is doing nice work. "Down for some more changes," reports W8AGF. W8FJE is the Cleveland Hta. Radio Club. W8DHI wants dope on ORS. W8BAH reports traffic picking up. W8ENJ will soon have ORS. District No. 2: W8BKM is busy taking bugs out of new receiver. W8EJ is working on 500-watt job. W8AQX is handling plenty. W8EJY worked a W6 with his '45. W8DMK is using crystal. District No. 3: W8CSB is considering 1750 kc. W8AND doesn't like "skip." W8APC reports new ham, W8GBG. W8BTT says not much activity. District No. 4: W8EEQ is putting District 4 on the map. W8QC is studying for Commercial ticket. W8OQ lost antenna in wind storm. W8UW will want ORS soon. W8ATV is busy with school. W8DWT has some dandy schedules. W8ANZ reports organization of Plymouth Radio Club with eight members and club call letters, W8FYX. W8OQ and W8HT have new MOPAs. District No. 5: W8DFR is busy with work. W8BMK was only on two weeks. W8LI gets on about once a week. W8EXI will soon be ORS. W8BSR ran up 496 in recent ORS contest. W8DVE is still going FB. W8BZL has new crystal transmitter. District No. 6: Look for RM W8NCNM on 3750 kc. hereafter. W8ZG sends in nice report. W8CXF likes a '10 better than a '52. Hi. W8BBH is experimenting with Pentodes. W8ARW has new 'phone job. District No. 7: W8VP is new RM for this district. W8CKX lost mast in storm. W8ANS will soon be an ORS. District No. 8: W8CGS is getting his district lined up FB. W8FA reports from Dayton U. W8ALQ is putting Cincy on the map. W8ENH is working out fine. W8ESG reports from Harrison. OK, W8CWF, will send you dope. W8TQ applies for ORS. District No. 9: W8EQB is using new MOPA. W8EQF wants ORS. OK, W8HH, but we are sure sorry to lose you.

Traffic: W8DDS 700, W8BAH 288, W8DFR 238, W8VP 203, W8DVE 181, W8NCNM 155, W8ANS 155, W8GZ 133, W8RN 131, W8CIO 115, W8EEQ 112, W8EY 109, W8EBT 94, W8EXA 81, W8BZL 77, W8BKM 61, W8BNC 61, W8DMK 46, W8CRB 55, W8FF 46, W8ALQ 43, W8DWT 42, W8EQB 38, W8AQX 37, W8BMX 37, W8BFT 31, W8FJE 30, W8DVL 29, W8CIY 29, W9CKX 25, W8AXV 25, W8BOT 22, W8EY 21, W8ENH 17, W8ETT 17, W8BKM 17, W8CSB 16, W8AND 16, W8OQ 15, W8ATV 13, W8CGS 14, W8HT 11, W8UW 11, W8CXF 11, W8BON 10, W8BBH 10, W8BSR 9, W8Q 8, W8APC 8, W8EJ 8, W8ANZ 8, W8ARW 6, W8AGF 8, W8FGC 6, W8EFW 5, W8FA 2.

KENTUCKY — SCM, J. B. Wathen, III, W9BAZ — Please, gang, let's win that Traffic Banner again! The Covington crowd came to Louisville, February 21st, and everyone enjoyed having them. W9OX acts as go-between for WIMK and Trunk-Line J. By the time this is read, W9BAZ's new outfit should be perking. W9BAN is finding

"school Spanish" inadequate for snappy So. American QSOs. Back home for awhile, says W9BWJ. W9JL is installing a 3.5-mc. antenna. W9CRJ is chief op. at W9HDY. W9HCO says, "no change this month." Anyone having a 50W socket for sale, write W9ARU. W9AUH is again rebuilding. W9CDA takes lead as chief letter-writer of the Section. We neglected to give due credit to W9DDQ for QSO with Japan! W9HAX applies for ORS. W9EQO makes a good waiter, and it is the verdict of the gang — "his wife is a good scout." W9GON has greatly improved his 'phone. W9LH is improving entire outfit. What has become of W9EDQ's big totals? W9EYW is devoting much time to improving his 'phone quality. W9ABV is "enowed under" with school work. W9CWZ finally got a CW outfit on 3707 and 3900. W9EDV has a new antenna. W9FVZ was practically burned out. W9BBO better get active. W9BEW expects to move back to Ashland. W9QT took active part in the Goodwill Tests. W9BZS put in 211. W9ERH is at last active. The gang at FTW, Hopkinsville, reports that W9GOB is due back on the air with new outfit.

Traffic: W9OX 70, W9BAZ 51, W9BAN 43, W9BWJ 36, W9JL 32, W9CRJ 22, W9HCO 19, W9ARU 13, W9AUH 13, W9CDA 11, W9DDQ 11, W9HAX 9, W9EQO 7, W9GON 6, W9LH 6, W9EDQ 4, W9EYW 3, W9ABV 2, W9CWZ 2, W9EDV 1, W9FVZ 1.

DAKOTA DIVISION

SOUTHERN MINNESOTA — SCM, H. Radloff, W9AIR — W9EPJ sets the pace. W9FJK is ready to help those desiring Minneapolis schedules. W9BN reports increased A-A activity. W9BNN is helping a beginner get started at West Concord. W9DRG reports W9FTE moved to Kansas City. W9HFF is eligible as ORS. W9BKX works the coast on 1750 kc. The staff of W9YC meets weekly at luncheon to discuss "everything." W9CTB sent in his report from a Pullman. Unemployment helps the traffic game, says W9HRH. W9EPD traded junk with W9GGA. W9HXR and W9HOF step out for DX. W9ERT is still adding operators. W9DH has crystal job. W9FCC uses a pair of '10s. 7 mc. is NG at night according to W9EFK. W9HGN is on 3.5-mc. band. W9GZQ reports W9AEL a new station at Brainerd. New power transformer and '66s at W9DGE. W9LN reports W9CYZ of Virginia a visitor. W9FJK installed pentodes. W9CPP, an old-timer, traded a motorcycle for W9BHZ's transmitter. W9DRK wants more traffic. W9LS keeps three transmitters on the air. W9FFY is QRL studies. W9GUX keeps schedules. DX hath charms for W9DMA on 14 mc. W9QE wrote the SCM a pleasant letter. W9AQH schedules Canal Zone. W9FCS desires afternoon schedules. W9HMY reports prospective hams. W9HNO gets out with '45. W9ZT water-cools his 1 KW. W9GBZ works coast on 1750-kc. 'phone. W9BKK has a keen 56-mc. rig. W9HCW worked on his set. W9FNK and W9COS will join U.S.N.R. W9GLE has MOPA. W9GMD ops at W9YC. W9GFA is rebuilding to MOPA. W9FAD changed OBS schedule to Tuesday and Wednesday at 9:30 p.m. on 1820 kc. School QRM at W9EYL. W9HKI experiments with receivers. W9BQF says W9ATP needs a portable license as his transmitter is on castors! W9FMB uses Standard Frequency Transmission. W9FLE added ag rf to his receiver. W9DMC is a pre-war ham. W9BGG tells of the gang giving him 100% modulation reports on his 'phone when he really modulates only 73% by measurement. W9BQJ works the coasts with 3.6 watts to a '12. W9EJR is recovering from four months' illness. W9DBC had a wreck in his shack. W9ELZ is the call of 151st Field Artillery of Mpls. Remember, fellows, examinations for amateur operator's license is given by the U. S. Radio Inspector at Room 413 of The Federal Building, at St. Paul, beginning 9 a.m. the first and third Saturday of each month. Get your blue ticket!

Traffic: W9EPJ 397, W9AIR 238, W9BN 236, W9BNN 199, W9DRG 193, W9BKK 143, W9HFF 108, W9BKX 103, W9CTB 39, W9HRH 30, W9YC 42, W9EPD 23, W9HXR 23, W9ERT 20, W9DH 19, W9FCC 15, W9BEC 14, W9HGN 14, W9GZQ 13, W9DGE 11, W9LN 10, W9FJK 9, W9CPP 8, W9DRK 7, W9LS 5, W9FFY 5, W9GUX 4, W9DMA 4, W9QE 4, W9AQH 3, W9FCS 3, W9HMY 2, W9ZT 2, W9EYS 1. W9GBZ 9 (January).

SOUTH DAKOTA — Acting SCM, Stanway Gough, W9DNS — W9EDX let his operator's license expire. New stations are W9FOQ at Redfield and W9ERQ at Lennox. W9BJV is a new ORS. W9ERQ fastened one end of his antenna to the city's 150-foot water tower. W9TI is active on 1750-ke. 'phone. W9ALO built a six-tube push-pull MOPA. W9CFU is installing a '52. W9HAF bought a new crystal which he gave to his YL. W9HHW has a TNT rig. W9HJU and W9BLZ have been working good DX on 14 mc. W9FIO is new at Huron. W9HZZ expects to handle 1000 messages next month. The way to reach a high position is to set a high goal.

Traffic: W9HZZ 288, W9FLI 261, W9HJU 165, W9DKL 82, W9BLZ 57, W9BJV 53, W9FKL 42, W9EDX 39, W9HHW 32, W9DB 28, W9FOQ 15, W9HSH 6, W9ALO 5, W9CFU 4, W9DNS 3, W9ID 1.

NORTH DAKOTA — SCM, Guy L. Ottinger, W9BVF — There are many good crystal stations in the state now: W9IK, W9DYA, W9DGS, W9HJC, W9BAY, W9DFF, W9EVQ and W9CBM. FB! W9IK holds the record for most traffic by 'phone in N. D. W9DGS has flea power 'phone. New ORS: W9GER Mandan, W9DOY Fargo. W9DFF rebuilt to 75-watt crystal. W9DGS and W9HJC have Trunk Line certificates. W9CRL reports new ham, W9DTX. W9EVQ ran up a little score in the W/VE contest. W9DM, W9FMC and W9EMY say too much business. W9BVF is taking in the Int. Goodwill tests. W9CBM, W9DGS and W9BVF have applied for unlimited licenses. Let's have more ORS applications.

Traffic: W9DGS 194, W9IK 99, W9BVF 48, W9CRL 72, W9EGL 54, W9DYA 14, W9DFF 6, W9DM 2, W9BAY 4, W9EMY 4, W9EUQ 19, W9HJC 79, W9ASP 13, W9DOY 4.

NORTHERN MINNESOTA — SCM, Ray Weihe, W9CTW — W9BRA takes traffic honors again. W9BBL had the flu. W9FNJ has a Naval Unit formed. W9BVI is still DX king of the Section. Right in W9AOK's shoes. W9FQI reports via radio. W9DOQ has a traffic net organized. W9HDN is trying 'phone. W9AVZ is trying bent note break-in. W9HIE enjoyed the ORS QSO Party. W9EGU reports DX scarce. W9BAR has been building. W9EOZ was bitten by the 'phone bug. W9CTW entered the DX tests. W9DRB is making a new ham. W9GKM has new power supply. W9FNJ is off the air. W9HEN is removing bugs from his transmitter. W9EHI works DX. W9HZM is QRMed by police station. Lindesmith is our new Director for the Dakota Division. Here is wishing him good luck. We know that Lindy will do the best he can, and it is up to all of us to cooperate with him. This will be my last report as SCM of Northern Minnesota. I have enjoyed it very much, and wish to thank all of you who have helped me. Do your best to help my successor put our Section on the map. 73.

Traffic: W9BRA 103, W9BBL 46, W9FNQ 37, W9BVI 31, W9FQI 20, W9DOQ 17, W9HDN 16, W9AVZ 14, W9HIE 12, W9EGU 9, W9BAR 7, W9EOZ 6, W9CTW 4, W9DRB 4, W9GKM 2, W9FNJ 2, W9HEN 1.

DELTA DIVISION

MISSISSIPPI — SCM, William G. Bodker, W5AZV — W5ANX has sold out his garage business. At the meeting of the Jackson Amateur Radio Assn. held February 20th, several visitors were present, including W5ID and W5AG of Canton and W6HS from Phoenix, Ariz., who intends to make Jackson his QTH. W5VJ has a 3.5-mc. crystal job almost completed. W5ANP is back on 3.5-mc. W5BUI has been reappointed ORS. The SCM visited W5BXZ at Brookhaven.

Traffic: W5BUI 60, W5AZV 55, W5BZG 7, W5ANX 22, W5VJ 6.

ARKANSAS — SCM, Henry E. Velte, W5ABI — W5AAJ is keeping schedule in the AA Net. W5JK has rebuilt. W5CCY and W5UI use type '10 tubes. W5BKB is getting out well. W5FE is now a married ham. Congratulations, OM. W5BRI is in the OWL Net. W5BDB wants traffic. W5BUX is a new station reporting from Pine Bluff. W5BED has five schedules. W5ARP is a new station. W5ADT is rebuilding. W5BDW handled some traffic. W5IQ hands in a nice traffic report. W5FM is still on the job. W5CR is going to school in Fayetteville. W5BML, we believe, leads the Delta Division in traffic handling this

month. FB! W5ABI wishes to thank his many friends for their kindness, sympathy and beautiful floral offerings extended in the loss of his beloved wife. Let's all report next month.

Traffic: W5BML 615, W5IQ 369, W5ABI 52, W5BKB 42, W5CR 34, W5AAJ 25, W5FM 20, W5JK 19, W5BED 11, W5CCY 10, W5BRI 12, W5BDB 10, W5BUX 9, W5BDW 6.

LOUISIANA — SCM, Frank Watts, Jr., W5WF — W5AYZ is Shreveport's own YL. W5EB has an '04A on 3960 kc. and an '03A on 7215 kc. W5ASJ is fluttering forth on 7 mc. W5BYQ works 'em on 7 mc. W5AKT reports traffic. W5BPN wants ORS. W5AXS built an AC receiver. W5KC reports. W5AIB handles traffic. W5HR has a punk Sargent receiver. W5BPL doesn't quite make BPL. Hi. W5RR-W5WI are heard occasionally. W5BDJ is again on the air. W5FR-BHV is the AA man in Monroe. W5BYY is perking little. W5BZR forgot it was report time. W5BEI is a beginner. Ex-YSIDN visited the SCM. Alexandria, Lake Charles, Minden and Monroe are all dead so far as reports are concerned. W5WF keeps schedules on the Trunk line. There are too many call swipers and forgers in this Section. If you hear a person using a call W5BKL or W5? try your best to find out where his is as W5BKL is no longer the call of Edmund Smith of Shreveport. If you find out who and where they are, let the SCM know.

Traffic: W5EB 21, W5BPN 20, W5BPL 1, W5AXS 19, W5AKT 6, W5AYZ 14, W5AIB 14, W5ASJ 2, W5BYQ 6, W5WF 776, W5KC 11, W5HR 1.

TENNESSEE — SCM, James B. Witt, W4SP — W4GX sends in the best report. W4HA at Springfield formerly operated station W9DTM in Iowa. W4ATU is using a W205D.

Traffic: W4GX 271, W4HA 102, W4ATU 31, W4SP 14, W4AAO 5.

HUDSON DIVISION

EASTERN NEW YORK — SCM, R. E. Haight, W2LU — W2KW, W2BKM, W2BUN are three welcome new members of the ORS gang. W2BZZ takes the honors this month and makes BPL again. W2UL comes next with FB total from results of Chicago Radio Show. W2LU, W2DEL, W2BJA and W2BZZ connect with the Trunk Lines. W2BKM wants NYC traffic. W2CFU keeps constant schedule with W9AAB. W2BLU reports two new hams in Oliveville, W2AHP and W2BLZ. W2BWF reports off-freq. stations falling off. W2ANV has four schedules. W2AJD delivered messages from P. I. 30 days ahead of mail. W2ACD speaks out FB on 'phone and CW. W2BIA: a burn-out, Fire Dept. not necessary, but junk dealer called. W2BZW sends in his first report. W2CJP uses his portable. W2ZZK, on 14 mc. W2CTC picks off DX on new National receiver. W2CGO worked VK5AW and K5AA on 7100 kc. W2CJS is popular pharmacist. W2BVR reports many DX records. W2BTW changed to 14 mc. W2OP entered DX tests with automatic Brass Pounder. W2BDB makes final report as he changes QRA to NYC. W2KW can be heard on 4 mc. W2ATM says W2DNN is latest arrival in New Rochelle. W2CL is using '03A in P. A. of CC job. W2BSH will be going strong shortly. W2ACB is QRL with G. E. Co. W2CTA leaves the boys. W2BJX is Secretary of Mid-Hudson A. R. C. W2DOS is new ham in Poughkeepsie. W2BGB is using Class B modulation. W2CEO with help of W2COY is building 50-watt 'phone. W2BWG puts out a wicked wallop on 'phone. W2AGZ, W2BJX and W2CGT are having BCL interference difficulties. W2CGT is building a crystal rig. W2BUN can be found on 3650 kc. W2ACY sends in FB report on DX. W2DQT makes initial report. W2CQH will be heard with a W2ZZ-call when he is out of town. W2BNA is QRL in Norfolk, Va. W2BWB is going to try his luck on 1750-ke. 'phone. W2AVS is building a new receiver. W2VU is going to use crystal on 3.5 mc. W2BCQ is having trouble with new transmitter. W2DQD and W2DNN are new hams in Section. W2AVS' report received at last minute.

Traffic: W2BZZ 615, W2UL 349, W2LU 297, W2BKM 100, W2DEL 78, W2BJA 76, W2CFU 63, W2BLU 56, W2BWF 54, W2ANV 47, W2AJD 36, W2ACD 28, W2BIA 25, W2BZW 24, W2CJP 22, W2CTC 22, W2CDB 17, W2CJS 16, W2BVR 13, W2BTW 11, W2OP 11, W2KW 9.

W2BDB 11, W2ATM 8, W2CL 7, W2CGT 4, W2BJX 4, W2BUN 3, W2ACY 2, W2CTA 1, W2BWB 18, W2AVS 35.

NORTHERN NEW JERSEY — SCM, A. G. Wester, Jr., W2WR — W2BPY, the RM, handled a lot of traffic. W2COG is in the employ of the Bakelite Corp. W2CWX is maintaining a few schedules. W2CJX complains about 'phone QRM on 14 mc. W2AMR has a schedule with K5AA. W2DV schedules W1AJW and W2AG. W2CNL is held up on his 1KW job due to the depression. W2BKE spends most of his time on 'phone. W2CFY reports a new radio club, the Passaic Amateur Radio Club. W2AIF has a new dynatron. W2DIU again has the highest traffic total! W2BBU and W2AGO have been appointed ORS. W2CLX complains about hams not returning QSL cards. W2CBY wants a schedule with the 1st District for Sunday mornings on 3.5 mc. W2ALD is experimenting on 1.75 mc. W2DFM handles more traffic each month. W2DJC sends in his initial report. W2ABT is going back to c.c. W2BCH has at last worked some DX. W2ASH has trouble getting a good note. W2DES is stepping out on 7 mc. W2CDQ has been chosen to go with the next Byrd Antarctic Expedition. W2CZZ will leave soon for his station on South Jersey. W2DDV, W2CDR is now a member of the U.S.N.R. A new radio club in Elizabeth is called the "UCARA." W2BYD and W2BSS are working plenty of DX. W2BDX hasn't much time for amateur work. W2BW1 has improved his note. W2DIG sold a blackboard at a bargain to the "UCARA." W2AUP had a great time at the RVRC hamfest. W2AEY had his car stolen. W2CPR complains about bad radio conditions. W2DQE is a new station at Matawan operated by two brothers. W2BQT promises to show some action in traffic. W2CWR is still playing with his transmitter. W2DHU is banging all over with a '10. W2BJZ is using a crystal oscillator only on 7 mc. W2AUI blew a set of two volt tubes. W2ACL is fooling with antennas. W2AUQ is in the rebuilding stage. W2CCS is a big man, but plays the flute. W2AGM hopes to get out as well as he can play cards. W2COV dropped his YL so he now can pound brass. W2ALY is off due to loaning his transmitter. W2BRP has fine results with an Ultradyne circuit. W2BSA is studying radio engineering. W2CAO made a high score in the U.S.N.R. competition due to the hard work of W2AMB. W2AZL is a lover of hot dogs. W2CMP keeps a nightly schedule with W2CWD. W2DJY has a YL operator at times. Northern Jersey now boasts of seven YL ops. The hamfest held by the Raritan Valley Radio Club at Highland Park, February 8th, was a real success, with over 300 hams in attendance. W2DMY is stepping out with a single '45. W2CWQ delivered a message from V08Z and sent reply back via VE1BV in four minutes.

Traffic: W2AGX 4, W2COG 3, W2CWX 7, W2CJX 22, W2AMR 34, W2DV 8, W2CNL 21, W2BPY 135, W2BKE 6, W2CFY 1, W2AIF 10, W2DIU 218, W2BBU 172, W2CLX 10, W2CBY 14, W2ALD 45, W2DFM 27, W2DJC 7, W2ABT 16, W2AGO 95, W2AUP 113, W2AEY 6, W2CPR 4, W2DQE 34, W2BQT 50, W2CWR 5, W2DHU 8, W2CQL 6, W2DGQ 8, W2AUI 4, W2ACL 10, W2AUQ 2, W2CCS 4, W2AGM 2, W2COV 6, W2CSW 4, W2ASB 2, W2BRP 12, W2BSA 3, W2AZL 9, W2BBR 5, W2CMP 2, W2CWQ 35, W2DMY 25.

NEW YORK CITY AND LONG ISLAND — SCM, V. T. Kenney, W2BGO — Due to some delay in the mail, only the reports sent direct to me were received in time to be included in this report. The balance of those reports are probably lost between W2BPQ and W2BGO. W2AOY is a recent AA appointee. W2BDJ is president of the Manhattan Radio Club. The Club has moved to its new quarters at 503 West 145th St., and will soon be heard as W2CFC. W2BAS can be heard most every morning after 3 on the 3.5-mc. band. W2KG had such BCL trouble he was forced to move his antenna. W2WP keeps 22 schedules a week.

Traffic: W2WP 124, W2BGO 81, W2KG 41, W2AOY 18, W2BDJ 11.

MIDWEST DIVISION

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9BNT turns in a nice total again. W9FAM is still plugging along. W9DI is back in school at Lincoln. W9DMY enjoys nothing more than traffic. W9FUW is our champion

'phone traffic handler. W9EHW is doing FB AA work. W9EWO is busy with Convention Committee. W9DGL reports lots of fun chewing rag with 43 states. W9EEW's daughter will be in this territory on theatre engagement. W9DHA is busy arranging State Convention to be held at Grand Island, March 26th and 27th. W9BBS rebuilt his portable. W9EW got laid off at KGPI. W9DFR is busy at K0IL. W9GQQ is doing good traffic work. W9DHC can't see why he can't hook any Nebraskans. W9HTU has very good total. W9DBR, W9HYR and W9AZT report.

Traffic: W9BNT 705, W9FAM 547, W9DI 203, W9DMY 166, W9FUW 137, W9EHW 131, W9EWO 98, W9DGL 73, W9EEW 38, W9DHA 36, W9BBS 28, W9EW 21, W9DFR 6, W9GQQ 163, W9DHC 149, W9HTU 121, W9DBR 30, W9HYR 24, W9AZT 3.

IOWA — SCM, George D. Hansen, W9FFD — R. P. Griffith, RM: W9ACL pulls into the lead and enters the hall of fame by placing in the BPL. W9EJQ follows very closely. W9BPG handles a lot of Chicago Radio Show traffic. W9IO had the discouraging luck of having the '66s go west. W9FFD is experimenting with W9DFK and W9AHQ on 56 mc. W9DNZ is the Chief Owl in the A.A.R.S. Owl Net. W9BJP upholds his standard. W9EIV is QRL job. W9DFZ says the TSARC at SC is all set to cooperate in every way with the International Good Will Tests. W9ABE handles radio show traffic. W9FYC is holding schedules. W9ECB works the old 'phone with less than 5 watts. W9HMM is a first reporter. W9CWG has Dynatron working as an OO. W9AYC is still handling A.A.R.S. work. W9GWT lands an ORS ticket this period. W9FZO says ORS party boosted his total. W9CFB has a long haul schedule. W9DMX is getting lined up in the A.A.R.S. W9ERY is still in the running. W9ANO reports the old MOPA working well. W9AEW works lots of DX on 7 mc. W9AHX says the old '50 went "south." Hi. W9AFQ becomes active with a report. W9EHX reports new MOPA transmitter. W9FIB sends in his first report. W9EOE has gasoline motor generator for power. W9FEB is on intermittently. W9AHQ operates experimental 56-mc. transmitter. Another new report comes from W9BYJ. W9DIB even "begs" for traffic. W9BWF is having receiver troubles. W9GQE has new antenna. W9DFK is dickering with the ether around 56 mc. Another good month, another good total! Let's continue upwards.

Traffic: W9ACL 506, W9EJQ 407, W9BPG 353, W9IO 330, W9FFD 244, W9DNZ 220, W9BJP 205, W9EIV 200, W9DFZ 118, W9ABE 115, W9FYC 100, W9ECB 81, W9HMM 70, W9CWG 56, W9AYC 50, W9GWT 47, W9FZO 45, W9CFB 35, W9DMX 35, W9ERY 34, W9ANO 27, W9AEW 26, W9AHX 17, W9AFQ 17, W9EHX 15, W9FIB 15, W9EOE 11, W9FEB 10, W9AHQ 8, W9BYJ 8, W9DIB 2, W9BWF 1, W9GQE 1, W9DFK 1, W9GP 68.

KANSAS — SCM, J. H. Amis, W9CET — W9NI leads the Section. W9CFN has a new rig under construction. W9BGL is QRL school. W9DVQ is using both CW and 'phone. W9AWP has a new receiver. W9HWW is handling lots of Army traffic. Three new hams in Hutchinson W9CBZ, W9FPX and W9GDS. W9FMX is rebuilding. W9GCL is on 3.5 mc. and 1.75 mc. W9HL has three good schedules. W9FRC is using 1750 kc. for short haul traffic. W9DEB is handling lots of U.S.N.R. traffic. W9CET is having trouble with '66s. W9CXW will soon be on the air again. W9JA and the Manhattan gang are getting ready for the convention. W9NL was off the air a week due to sickness. W9ESL is installing Class B. modulation. W9GGK is a first reporter. W9GDH and W9DFY have combined stations. W9GCX and W9ARL are working DX. W9EVM reports most of the Emporia gang have gone in the U.S.N.R. W9EBE is rebuilding for crystal. W9FLG reports a new Jr. operator. Congratulations! We want every active station to report each month with lots of news and traffic.

Traffic: W9CFN 75, W9NI 149, W9GBP 46, W9CET 66, W9BGL 61, W9DVQ 86, W9HWW 60, W9AWP 4, W9BSK 3, W9EHT 24, W9FMX 29, W9FLG 34, W9GCL 10, W9HL 16, W9FRC 32, W9DEB 53, W9FXV 27, W9JA 18, W9NL 86, W9ESL 10, W9GGK 3, W9GDH 72, W9GFM 3, W9PV 3, W9DQJ 10, W9ATR 9, W9EVM 10, W9EBE 16. MISSOURI — SCM, L. B. Laizure, W9RR — St. Louis: W9MH reports lots of DX. W9PQ plans a new rig for 3750 (U.S.N.R.). W9GBV joined the U.S.N.R. as RM3C.

W9BCK is ready for ORS. W9PW and W9DZN renewed ORS. W9GTK apologized for small traffic totals and then turned in 60. W9SGO is trying to settle on 3.5 or 7 mc. W9HVN went back to 7 mc. W9BAF is on 7 mc. regularly. W9HVP tried to make three used 50-watters pull together. W9CCZ was appointed alternate net control for A.A.R.S. W9GTK is being lined up for ORS appointment. W9HVJ is doing business on 7 mc. W9DYJ kept a schedule with W9DZU. W9DZN had to move. W9GHH handled W1MK traffic from K5AA and VE1DQ. New stations in St. Louis: W9ACU—W9API—W9BHF. W9GHG worked DX all month. W9DOE keeps a schedule with W6CDK, formerly of St. Louis—W9CVD. License of W9BC is in for renewal. W9AMR is now using W9HUZ. State dope: W9EFC is going in Columbia. W9FJV is keeping schedules in all directions. W9BAU is having key click trouble. W9CZI is working 3517-ke. 'phone. W9HCP is going in Rolla—QRA Box 43. W9CRM is trying to get going again. W9DZV and W9DCB are new stations in Columbia. W9FBO works in Columbia week-ends. W9ECE reports: W9BDS lost antenna in wind-storm; W9DWK is again handling traffic; W9GEF is messing with 'phone. W9DXD visited the SCM. W9AIJ kicked over the bucket with 184 messages. Bad school QRM reported by W9FSL. W9FSU keeps regular 5 a.m. schedule with W5ASF. W9GXT kept a schedule with W9HPK. W9TJ is back home in Raymore after some years in Windburg on the Lake as W9PK. W9HVV is a new Pleasant Hill station. W9EYG kept a schedule with W9ENF. W9ENF keeps schedules with W9FJV—W3CAB—W9ECE and W9CJR. W9CUT is a new station in Joplin. W9BJA is somewhat improved but not enough to get on the air again. W9DCD keeps schedule with W9AWE daily. W9ASV is on again. W9CJB worked too much DX to list here. W9ECB relayed most of his on 7 mc. W9HNM is trying to line up new schedules. W9FYM keeps schedule with W9FJV. W9FNI doesn't get on regularly enough for traffic. W9DHN got new '10 to replace four-year-old one; W9AOG was a visitor at W9DHN. W9GQY is working a pair of '45s. Kansas City: W9DQN reports trouble trying to QSO west coast. W9DPJ was out of town most of January. W9GCG lists a long string of DX. W9GXM joined the U.S.N.R. W9HRX says school QRM bad. W9EDO visited the SCM to report. W9FHV 'phone a report. W9AOG junked '45s and put in '47 pentode oec. for crystal rig; W9FHF is still using PP '45. W9AKZ says ND this month. W9GHA delivers 'em. W9GXM hit the ORS QSO Contest. W9CFL is rebuilding NDP for the big soup! W9RR visited Topeka, Manhattan, Wichita and Emporia this month for U.S.N.R. enlistments—70 men joined since January 1st. New U.S.N.R. units organized this month in Marcelline and Emporia. W9DXY, former Midwest Director, is now Unit Commander in Omaha. W9CVT says a 211D seems to do about as well as the former 212D. W9GOM, W9HEA and others are planning U.S.N.R. unit in Bethany. We welcome a number of first-time reporters this month—enough to balance a few former reporters who dropped out; more, in fact, as there are eleven more reports of traffic than in last report.

Traffic: W9PW 16, W9GBV 6, W9BCK 5, W9GTK 60, W9HVJ 4, W9DYJ 79, W9GHH 11, W9MH 100, W9DOE 10, W9GQY 14, W9DHN 20, W9FYM 9, W9HNM 31, W9EUB 28, W9FSL 129, W9CJB 19, W9ASV 41, W9DCD 10, W9AWE 5, W9ENF 72, W9FJV 230, W9EYG 15, W9TJ 11, W9HVV 5, W9HCP 15, W9GXT 2, W9HPK 2, W9FSU 86, W9ALI 184, W9DXD 29, W9ECE 66, W9DWK 4, W9DZV 2, W9DCB 2, W9CZI 10, W9BAU 6, W9HWE 17, W9HEL 3, W9GCH 6, W9GHG 1, W9CAK 2, W9GDU 2, W9CDU 13, W9HLP 5, W9AAU 34, W9ZK 1, W9DUD 7, W9GMI 43, W9BC 6, W9FVM 2, W9CON 4, W9DOB 7, W9EPX 2, W9FNI 1, W9GHA 7, W9AKZ 1, W9FHF 2, W9HHC 11, W9DQN 4, W9DPJ 1, W9GCG 10, W9GXM 83, W9HRX 6, W9AOG 19, W9EDO 4, W9FHV 39, W9AZL 2, W9HEA 7, W9AAO 4, W9CFL 6, W9NP 421, W9BGW 36, W9PR 4, W9DHX 10, W9HOD 7, W9RR 9, W9GSV 14, W9FPI 53, W9CVT 7, W9ELS 13, W9EQC 35, W9BZW 10, W9CVP 12, W9ENU 18, W9BMT 4, W9ZZ 5, W9FBR 18, W9GUN 16, W9DFT 2, W9MC 14, W9EVW 7, W9BIU 1, W9FIO 31, W9FLT 16, W9AWC 11, W9FCF 6, W9BMA 173, W9AQX 69, W9DMO 12, W9GOM 109, W9EFC 54, W9GQG 2, W9CJR 65, W9BWS 4, W9GNM

22, W9GOQ 1, W9GZY 8, W9CRH 10, W9BMU 13, W9BGN 54, W9BZY 9, W9HUI 10, W9HUN 6, W9FAL 15, W9GJF 5.

NEW ENGLAND DIVISION

EASTERN MASSACHUSETTS—SCM, Joseph A. Mullen, WIASI—W1ABG is worried over BCL QRM. W1AAL reports better traffic conditions. W1ACH had a trip on the snow train while up to see W1BST in Laconia. W1ME is having trouble trying to keep his 60-footer in the air. W1CAW reports the Norwood QRM Club going full blast. W1ASF makes the BPL! W1WU has his new job partially finished. Our consistent traffic vendor, W1AFP, pours in 162 total. W1KH is still working V08AE daily. W1LQ has had family QRM in the form of sickness. W1CHR has been tied up with school exams. W1BO is experimenting with Beverage antenna. W1CFI is installing a pair of '04s. W1AK reports his antennas on the ground. W1BFR says things are slow. W1LM reports the same thing, but has 114 messages. W1BZQ expects to have his high-power job back again. W1BNJ blew up things playing with crystal. W1AFP has just put in a pair of '60s. W1BGW has an '04A on 3675. W1CQN's MOPA went haywire. W1AGA has tied Marthas Vineyard to the mainland with an excellent schedule. W1WV is doing a fine job on the trunk lines. W1AIO reports for the first time. W1BOE has a daily schedule with W2CFU. W1AKY is getting ready to move back home after his three months of tests with the Quincy Police Department. W1CUO reports W1AGR on air again with low-power 'phone.

Traffic: W1ASF 511, W1WV 235, W1AFP 162, W1ABG 152, W1LM 114, W1KH 67, W1BOE 50, W1ACH 46, W1ASI 36, W1AAL 35, W1BZQ 31, W1BFR 25, W1MX 24, W1CHR 24, W1BGW 22, W1ME 21, W1WU 17, W1LQ 15, W1AGA 11, W1AFP 11, W1CQN 11, W1CAW 10, W1BNJ 10, W1AK 4, W1BO 2, W1AIO 1, W1CUO 2.

WESTERN MASSACHUSETTS—SCM, Leo R. Pelquin, W1JV—Every ORS in our section is cooperating with the SCM—100% report this month. Those who are not yet ORS are asked to turn in reports on traffic handled on the 16th of each month. Stamped report cards will be furnished, no charge, by your SCM. Don't forget to attend the New England Convention at Providence. The gang there have been working for several months to make it enjoyable for you. W1ASY leads again in traffic with W1BVP a close second. W1AZW has changed his to T.P.T.G. W1NS reports activities at the Blackstone Valley Radio Club are good. W1AFI applies for ORS. W1APL is putting in a '52. W1BNL is on 1.7 mc. W1BFX and W1BNL report handling traffic from China. W1ARRH is new ORS. W1CCS, W1AFI and W1AVW promise to give W1ASY plenty of competition for traffic honors. W1AQM is now crystal-controlled.

Traffic: W1ASY 134, W1BVP 119, W1AUQ 109, W1AZW 99, W1NS 90, W1AFI 56, W1CPG 50, W1APL 45, W1BNL 44, W1BFX 42, W1ARRH 41, W1CCS 35, W1AIF 29, W1AQM 19, W1BPN 18, W1CCH 18, W1OF 16, W1BVR 14, W1BWY 12, W1ATK 7, W1BKQ 9, W1CVN 5, W1ZB 5, W1NQ 2.

MAINE—SCM John W. Singleton, W1CDX—W1BOF is winner of the Maine Section traffic contest which ended with this report. The SCM is getting over the Flu. W1CFG has a new "break-in" system. W1ATO is busy with U.S.N.R. W1BEZ is that chap with the crystal note. W1CPT works plenty of DX. W1BOZ comes through with a nice total. W1CIP reports that W1ATA will soon be on with a fifty. W1BUO is in line for ORS. W1ANH is busy getting WAGM on the air. W1EF reports via radio. W1CEQ is busy with his "chickens." W1BEU wins second prize in the traffic contest. W1BWS is keeping Lewiston on the map. W1BLI has been busy grinding quarts. W1VM is going to have crystal signals too. W1CRP says black lacquer doesn't make good dope for coils. W1AQW is going to increase power. W1APX wants more schedules. W1CNH reports for first time. W1BFZ says local QRM is very bad. W1AFA has a big tube going on 7110 kc. W1QH is still keeping schedules with the YLs. W1AGL and W1BWO are rebuilding his shack. W1AXJ reports that W1CRU has a nice 50-watt 'phone going. W1BSO sends his second report. W1BTG

says everyone in his vicinity is going in for 'phone. W1AUW is getting out fine with low power. The Brunswick gang are planning a FB Hamfest, to be held on the 9th of April at the Eagle Hotel, Brunswick. This looks good, gang, better be there. The winners of the Maine Section traffic contest are as follows: WIBOF, 826; W1BEU, 778; W1ATO, 749; and W1CPT, 708.

Traffic: W1BOF 300, W1CDX 207, W1CFG 201, W1ATO 180, W1BEZ 181, W1CPT 144, W1BOZ 140, W1CIP 81, W1BUO 69, W1ANH 69, W1EF 65, W1CEQ 62, W1BEU 62, W1BWS 58, W1BLI 46, W1VM 45, W1CRP 37, W1AQW 30, W1APX 29, W1CNH 25, W1BFZ 16, W1AFA 12, W1QIH 12, W1AGL 8, W1BSO 3, W1BTG 2, W1AXJ 4. VERMONT — SCM, Roy L. Gale, W1BD — W1CGV is W2DQE temporarily. W1CUN is off the air indefinitely. W1BZD says there are several fellows in his town learning the code. W1DHX is troubled by key clicks. W1AHN has applied for admission to the Army-Amateur Net. W1AZV is an old spark-day ham come to life. W1BDX and W1CGX find no depression in the radio service business. W1DOH is another old-timer resurrected. W1AD reports Navy net QSO parties being held each Sunday morning. W1CBE has a new transmitter. W1BJP and W1DGU took part in the Vt. QSO party. W1DAJ likes his new Zepp. W1AXN is giving 1750 kc. a whirl. W1CBW is becoming interested in traffic handling. W1BDY is building an A.C. receiver. W1AAG and partner found the floor too hard for their fifty! W1SV has a broadcast operator's license. W1BRJ is in the throes of a revolution which we hope will prove to be only a slight rebellion. W1BNS is sharing the RM work with W1ATF. W1DPO is a new station. W1BHR is through with amateur 'phone. W1CIY is the station of Maynard Walker in Brattleboro. W1DAJ and W1DAQ are dipping into 56 mc. W1BAS reports that the National Guard boys are doing well with the code. W1AVP claims his is the poorest outfit in the state. W1BD is all at sea; can't decide whether to try 28 or 1.75 mc. The SCM hopes that the beginners not reporting will soon come in and join us.

Traffic: W1ATF 173, W1AXN 97, W1BNS 54, W1BD 37, W1BJP 24, W1CBW 19, W1CGX 15, W1DAJ 2, W1CBE 2, W1BHR 2, W1BZD 1.

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ — W1APK finds 1750 kc. very FB. W1AYA keeps daily schedules with K5AA. W1BAB is back on the air. W1UN is handling weather reports for U. S. Weather Bureau. W1BFT is now W2COQ in Schenectady. W1CCM is much better. W1BVJ is keeping schedules. W1IP has been appointed a Trunk Line Station. W1AUU's 'phone is getting out well. W1BXU is building a fine crystal rig. W1AVG is building a 3/4 KW job. W1DLQ is working lots of DX. The Dover Radio Club now numbers eighteen members with meetings twice monthly. W1CGH is building MOPA. W1HG and W1UN gave talk at Rotary luncheon on Amateur Radio. W1BRT has a new crystal rig. W1BCP's new '42 crystal 'phone job ought to be FB. W1CVK is getting out fine. W1BGL is now IRE. W1AMP is building a '52 'phone job. W1CGJ reports all AC at his shack. W1BFY is on the high seas again as commercial op. W1DQU is new ham in Claremont. W1AXL wrecked his '10. W1LY is getting out well with a '45. W1BAC was kicked across the room by his high voltage. Hi. Dr. and Mrs. John Alden Stewart, W1SK, announce the arrival on February 27th of John Alden, Jr. Congrats!

Traffic: W1IP 437, W1UN 158, W1AYA 135, W1HG 21, W1APK 17, W1BAB 11, W1CGJ 6, W1BXU 4, W1CVK 3, W1CCM 1, W1AUU 1.

CONNECTICUT — SCM, Fred A. Ellis, Jr., W1CTI — RP keeps the tubes hot at W1MK handling traffic with the Yale Expedition and Research ship Atlantis. W1BDI, operated by "FH" and "EV" (W1UE), makes the BPL RM W1CJD finds time to pound plenty of brass; he reports for W1BFH, W1BFU and W1BAI. W1AMG is going stronger than ever. W1BEO was unable to make the ORS party. W1AOK reports a new ham, W1DNG. The transmitter at W1HD started popping crystals so Dan shut down. W1ES is now an ORS. FB, "AH." W1ADW is trying to get his local gang interested in traffic. W1QV has a new crystal job on 14014 kc. W1AZK is a new station in Westport. W1BCG is QRL service work. Visitors at W1CTI during the month

were W1BHM, W1ARB, W1FL, W1BCG, W1AMG and W1AXB. W1BHM entertained twenty-two of the Conn., mostly ORS, gang at his time. W1BDI, W1UE and W1FL were present from Headquarters. W1TD, President of the TCRC, and W1FL, President of the CBA, spoke on the activities of their respective clubs. Reports on traffic routes were given by RMs W1BHM and W1CJD. SCM W1CTI raised the question of traffic totals and there was a fine discussion. Refreshments were served by W1BHM's mother and sister. What happened to W1AFB? W1ASP made 1758 contacts for the year ending Feb. 1st. W1AXB reported by radio from W1CLY. W1BNB operates week ends. W1AHC says he gets bad QRM from street cars. W1CDS is pounding brass at W1AHC. W1BAX sends in a nice report. W1AVB's crystal is getting out better. W1APW will have a crystal PP rig going soon. W1CUX handles his traffic on 7 mc. W1AMQ is setting a quota of at least 25 per month for his station. W1DCM says traffic scarce on 7 mc. W1AQF has been transferred to Hartford. W1TD is trying to get out on 3.5 mc. in a poor location. The Yale Radio Club, W1YU, entertained over 150 hams at one of their recent meetings. A.R.R.L. President Maxim gave an excellent talk on amateur radio. W1AZG reports W1DOV and W1DPK new hams. W1APJ worked the 6th district on 3.5 mc. W1BVW handled traffic for National Guard Communications Specialists of Benning Alumni Association. W1CTC handles traffic on 1750-ke. 'phone. Come on, you 'phone men! W1APZ reported by radio via W1AZK. W1BFS gets RAC from a DC supply. The Taft Radio Club, W1CIG, sends in a fine report. W1ADJ has been on the sick list. W1FL is adding a 50-wattter to his crystal rig. The TCRC and the CBA hold Sunday AM meetings over the air at 10 a.m. All Conn. stations, whether ORS or not, are urged to get on the air every Sunday morning at 9 for a Conn. QSO party. Listen for a QST from RM W1CJD and W1CTI and then get busy and see how many Conn. contacts you can make. A new code table has been installed at W1CBA. W1CBK is working 3500-ke. 'phone with good results.

Traffic: W1MK 411, W1BDI 371, W1CJD 302, W1AMG 228, W1BEO 179, W1AOK 179, W1HD 145, W1ES 82, W1BVW 74, W1YU 62, W1ADW 61, W1QV 50, W1CTI 46, W1BHM 40, W1AFB 33, W1ASP 30, W1APJ 19, W1BFU 18, W1AXB 15, W1BNB 14, W1AHC 14, W1BAX 13, W1BFH 11, W1APZ 11, W1AVB 11, W1APW 8, W1CUX 5, W1BAI 5, W1DCM 3, W1AZG 3, W1CTC 4, W1AQF 2, W1TD 1, W1CLY 1, W1BFS 1, Call Unknown 9.

RHODE ISLAND — SCM, N. H. Miller, W1AWE — W1AWE is on the air again. W1MO will be going soon. W1CAB handled some important traffic. W1BDQ is building a crystal control job. W1ATM did a lot of rag-chewing. W1EX is on 3.5 mc. W1BML calibrates ham stations with his prize frequency meter. W1DPN is none other than ExW1CFL, an old-timer. W1BES, W1ID, and W1TQ are on 'phone. W1GR has a FB 'phone on 14 mc. W1AFO, W1GV and W1FU keep up the reputation of Cranston. W1BGM is on 3 bands. W1BDZ has an MOPA. W1CPV is in the Army Net. W1BOY contacted 119 stations this month. W1ASZ is building a portable transmitter. W1BTP is looking for more high schools for the N. E. Federation of High Schools Radio Clubs. W1CGO is on with his new transmitter. W1AGB spent most time experimenting with antennas. W1BLV is high traffic man this month. W1BQD has a new receiver.

Traffic: W1BLV 187, W1BTP 60, W1CAB 50, W1CPV 33, W1ASZ 23, W1BDZ 14, W1BOY 10, W1CGO 7, W1AWE 7, W1BGM 4.

NORTHWESTERN DIVISION

OREGON — SCM, Dr. Dolph L. Craig, W7ALO — W7ACH leads the way with a fine total. W7ED is coming up fast with transpacific schedules. W7WR turns in his best report. W7AYN is recuperating from attack of nervous indigestion. W7AWH is new ORS. W7PE sends in a big list of off-frequency stations. W7BUH is a new ham in Tillamook. W7ABH reports for first time since 1930. W7AJN, W7AYV and W7SY report. W7BDU aspires to be an ORS. W7PL has joined the Army Net. W7ALM is busy servicing BCL sets. W7QY is going on *Eagle Boat 35* to Bremerton next month. W7AMF has a National SW3. W7AEM has a

portable call, W7BTQ. W7ZD has been on 14 mc. W7AVT is located in new QRA. W7APE is trying to locate W1MK. W7AWO worked his first Mexican. W7BSP is almost ready to go. W7AHJ is busy working on program. Mrs. Gene Stadden reported at club for W7IF. W7BCZ is busy with BCL work. The OWs put on a very FB program for the C.B.A.R.C. New calls in Coos Bay: W7BSW-W7BSH, W7BSP, W7BSI.

Traffic: W7ACH 328, W7ED 232, W7WR 166, W7AWH 101, W7AEM 50, W7QY 59, W7AMF 31, W7PE 22, W7ALO 20, W7ALM 18, W7AYV 15, W7PL 12, W7SY 13, W7BDU 8, W7EN 6, W7ABH 5, W7AJN 3, W7AYN 2.

IDAHO — SCM, Oscar E. Johnson, W7AKZ — W7AFT worked his first real DX, KGEF off the coast of Java. W7ALY is home from college. W7ATN is rebuilding. W7AJQ has new transmitters. W7KG made nice total in ORS contest. W7AYH has joined the A.R.R.L. Communications Net for the American Legion. W7ALC spends most of his time grinding crystals. W7BOS has gone to Chicago. W7AYP has been fighting QRM. W7BMF, W7BNO has decided to try c.w. W7AXY is in bed. W7AVP is working on his receiver. W7ACO has torn his layout to pieces. W7BEO lacks power. W7QD is plugging along. W7BAR is having trouble with super-het. W7BRU has been on with low-power 'phone. W7BRY wants to put an antenna on top of the apartment house where he lives. W7BKF is hot for traffic. W7QC was last seen on his way home from Canada. To you fellows who wish schedules: Get in touch with W7AYH, the new Route Manager.

Traffic: W7QC 24, W7AYH 16, W7KG 61, W7AFT 12, W7AKZ 20.

ALASKA — SCM, W. B. Wilson, W7WDN — Your retiring SCM extends his best wishes to the section and hopes that K7PQ will be successful in putting Alaska on a solid footing in amateur radio. The new SCM's better half recently received her license. K7BLI reports handling a Leap Year's proposal and acceptance. K7ATF is now using two '10s PP in TPTG. On Feb. 16th a snowslide completely destroyed the Jumbo Camp — location of K7BLI. The building in which the station was located was ground to pieces and buried under forty feet of snow. The operator luckily escaped uninjured. He sent his usual report via K7EZ-K7FF-W7TX.

Traffic: K7BLI 431, K7ACZ 48, K7ATF 46, K7BNV 37, K7BOE 129, K7BIF 18.

WASHINGTON — SCM, John P. Gruble, W7RT — Another good month for Washington, gang. W7TX makes the BPL on deliveries! W7AQB is new ORS. W7BCV keeps ten traffic schedules. W7OI is president of Fort Wright Radio Club, a newly-organized group near Spokane. W7BB handles his usual good bunch of traffic. W7ACS and W7BNI experiment on 56 mc. W7KZ has changed QRA to Route 2, Box 176, Olympia. W7AHQ keeps Anacortes going on 3.5 mc. W7JA was erroneously reported as W7AJ in last QST. W7JA is active at Wenatchee. W7AJ is located at Oak Harbor. W7WY keeps four daily schedules. W7BWR is a new ham at Vancouver. W7ADS sold crystal outfit. W7BHH is using 350 volts and a type '10. W7AYO is the new traffic manager for the Yakima gang. W7NV uses a 250-watt linear stage. W7ADU is grinding crystals. W7AF says his SW5 is FB. W7KO, W7QI, W7ACB, W7JF, W7AEV, W7BRS, W7GT, W7AXW, and W7RT keep Seattle well represented in activities. W7AGW gets broadcast quality from his home-made condenser mike. W7ANP extends invitation to all hams to visit NDQ, master control station for 13th Naval District, at Stacy Street Terminal, Seattle. W7AJS submits nice report on Centralia activity. W7ADK is call of Centralia Junior College. W7HS handled important death and funeral messages. W7AG handles his bit on 3507 kc. W7VG reported from Vancouver, B. C. W7AFC, W7APS, and W7HS are new ORS. W7AVM continues to broadcast official messages on 7140 kc. each Sunday at noon. W7EK favors us with a report. We welcome the first report from W7BHP. W7TP paid visit to W7ARI at Yakima. W7AIT handles important Alaskan traffic. W7AEX is trying 'phone. W7BUU is new ham at Wenatchee. W7AUC's '01A is getting tired. W7BBL has 30-watt crystal 'phone rig on 3.5 mc. W7BUQ, W7BUW, and W7BUX are new additions to Yakima bunch. W7BHW

handles a few. Through W7AIT we learn that Olympia's YL op, W7AOM, is to return to the air shortly. W7IA, voice of Kirkland, does some dandy phonograph record testing. Hi. Other active 'phones on 3.5 mc. are W7NQ, W7ART, W7VF, W7TS, and W7NK. W7AIE is using 14-mc. band. After long absence, W7VL returns to the air. W7AUN is another C.C. station at Spokane. Thanks to W7AHO for the Spokane dope. W7DL gets good results with tube-keying. W7AAO is building another super-het. W7BAC and several others have automatic sending machines for DX tests. More news needed from Bremerton, Tacoma and northern Washington. 'Phone hams are requested to report more frequently, also. All reports welcome. Shoot 'em in to the SCM each month promptly on the 16th.

Traffic: W7TX 221, W7BB 147, W7BCV 141, W7KZ 118, W7WY 108, W7ANP 93, W7HS 52, W7AG 34, W7BCS 30, W7QI 29, W7AIT 27, W7ACB 27, W7GT 21, W7BHH 21, W7RT 20, W7NV 19, W7OI 19, W7ACS 17, W7AJS 16, W7AHQ 15, W7AGE 13, W7AF 13, W7KO 12, W7AVM 11, W7JF 11, W7APS 10, W7AGV 9, W7APR 9, W7AIE 9, W7EK 9, W7AHO 6, W7HB 5, W7ADS 5, W7BAC 5, W7BNI 5, W7BUW 4, W7AGW 4, W7VG 3, W7AEV 3, W7BHW 3, W7AEX 3, W7AFC 2, W7BHP 1, W7BBL 1, W7ADU 1, W7AQB 1, W7AXW 1, W7AYO 1, W7BRS 1, W7BUX 1.

MONTANA — SCM, O. W. Viers, W7AAT — The SCM wishes to extend thanks and appreciation to the members of this Section who offered support in the recent SCM election. W7HP has a new Electro-Bug. W7ASQ keeps a daily schedule with his father, W9CAB, in Denver. W7CU has three schedules. W7AHF applied for OBS. W7ASB has a pair of 50-watters. W7BBS has been busy changing QRA. W7BGC wants a good schedule west. W7AFS has been working lots of DX. W7AIR's MOPA will not work. W7AST is going strong. W7AYG has a 211D now. W7BKM is rebuilding. W7AMK has moved to Shelby. W7BIZ sends in his usual report. W7AKO has an '03A for final amplifier. W7AAT has a new Zepp. W7BHB applied for ORS. Don't forget, gang, the motto of this section is "A report from each station every month on the 16th."

Traffic: W7AAT 37, W7AHF 29, W7CU 18, W7ASQ 15, W7ASB 13, W7BGC 6, W7AFS 11, W7BIZ 7, W7AMK 2, W7BKM 2.

PACIFIC DIVISION

EAST BAY — Acting SCM, H. L. Baseett, W6BSB — W6EDO tops the Section this month through schedule with KA1CM. W6ATJ is building his tenth crystal outfit. W6AF has handled plenty of Shanghai traffic. W6RJ burned out his power transformer. W6CDA says K6 stations not coming through well now. W6DLT is busy with Army Net. W6PB is building transmitter for 14 mc. W6EDR is still putting out the Official Broadcasts. W6AJA is building crystal set. W6CZN says it is too cold in the shack. W6AUT just got over an attack of blood poisoning. W6FII is a new ham in Napa. W6ZM built a monitor for W6RJ. W6AFQ and W6FBH are consolidating into a 250-watt 'phone. W6BWD is putting so much sap in the antenna that he can't find a meter big enough to measure it. W6AOH is putting '66s in his rectifier. W6BTW is going to radio school at Los Angeles. W6EMO is in Radio School in San Francisco. W6CXF is on with 'phone. W6ADM bought out a radio store to get parts for new crystal outfit. W6AIE is coming on with a pair of 45s. W6BTZ got his new radio school going. W6EGM is having trouble with his crystal. W6BBJ has changed his QRA. W6EOD reports that his AC receiver is FB. W6BQB can't get on the air on account of the de — (I almost said depression) Economic Situation. Hi. The Berkeley Radio Association had a QSO party on the air and report a fine time. W6ELW, W6BJW, W6JT, W6EW and W6JN are among those who have taken the new 'phone examination. W6BGR sends in good traffic report. The new Director, W6HM, was up to the last meeting of the Oakland Radio Club and was given a very cordial welcome. All ORC members have a CQ party every night at 7:00 p.m. W6FLP is a new ham in Oakland, having been coached by W6BQB. W6CX is rebuilding his 'phone. A few ORS certificates have not been sent in for endorsement. Unless they are sent in at once they will be cancelled.

Traffic: W6EDO 229, W6ATJ 197, W6AF 133, W6RJ 82, W6CDA 39, W6ZM 37, W6EJA 28, W6DLT 27, W6PB 26, W6AUT 8, W6EDR 2, W6BGR 45.

SANTA CLARA VALLEY — SCM, F. J. Quement, W6NX — Difficulties in the Far East have had their effect on amateur Trans-Pacific Communication and many messages are being handled to and from American citizens, who are directly or indirectly affected by the turmoil in China. W6AMM, the veteran Trans-Pacific contact station, is still in the racket with a nice total, closely followed by W6YG. W6NJ is third with a fine total. W6YL is keeping San Jose clear with daily schedules. W6DDS is getting into the traffic game. W6YU has a three-times-a-week schedule with NY and LA. W6HM, Director of the Pacific Division, due to the demands of his office was obliged to content himself with a smaller total. W6CEO and W6EI alternate with a daily schedule with OM1TB. W6CEO uses 400 watts input and W6EI 1000 watts input. W6DCP complains of poor reception. W6BMW has schedules with TH. W6ALW will be crystal controlled soon. W6FBW had bad QRM from power leaks. W6DNY reports that the Watsonville Club now meets at Roland Bye's home each Thursday. W6FBU is QRL account studies. W6NX is now on 1950 kc. with schedule with W6AJL. Three interesting talks by W6AO, W6AJ and Dave Atkins were given to the SCCARA members. The SCCARA meets each Monday, Chamber of Commerce Building, and all amateurs are welcome to attend.

Traffic: W6AMM 284, W6YG 266, W6NJ 177, W6YL 138, W6DDS 104, W6YU 93, W6HM 70, W6CEO 66, W6DCP 29, W6BMW 23, W6ALW 19, W6FBW 17, W6DNY 15, W6FBU 6, W6NX 20.

ARIZONA — SCM, Ernest Mendosa, W6BJF — Reports are wanted from every active Arizona station. "ORS" appointment applications are welcomed from reliable traffic handling stations. A "phone" "OBS" is needed in Southern Arizona. There is room for another "OO" or two. W6ALU again makes the BPL!! W6ALU and W6BRI, his XYL, are the new 7-mc. OBS. W6ALU-W6CDU has been appointed "Official Observer." W6BJF won the Army Amateur contest in the 8th Corps Area. W6EUT has changed QRA to 1045 No. 4th Ave. W6CKW handled a death message when telegraph and telephone wires were down. W6BVN has been appointed ORS, together with her OM, W6CEC. W6DRE is using one of his '52s, on 7000 kc. W6AEK worked K6BAZ on 3500-kc. 'phone. W6DOW burnt out one '10. W6CQF reports activities of other Tucson hams. W6CQR is gathering up parts for a 56-mc. 'phone. W6CVW, OBS, is getting out FB. Thomas Wheelin is waiting for his call letters to operate W6CPF's transmitter. W6FKX, ex6DWP's new call, is on 7000 kc. W6BYD has his class "B" modulator in operation. W6DKF works 7000- and 3500-kc. CW, and 3500-kc. 'phone. W6DNP reports W6EL working daily 'phone schedule with W6DJH. W6BM at Whipple Barracks is building a 'phone. W6BST's sister, W6ML, of New York, is in Phoenix. Ex6SE-Ex6EBH-Ex6EKP will soon have his fourth call. W6AYW and W6FKX have also "rolled their own." W6EFC is departing for an indefinite stay at the Los Angeles U.M.C.A. Radio School. W6DIE is making lots of noise on 7000 kc. W5AHI-W5ZZT, former New Mexico SCM, has a mailing address at Yuma, but his station is on the California side of the Colorado River! W6DJH wants a 3.5-mc. 'phone "OBS" appointment. W6CTI, ex6EAA, KTAR opr., has our congratulations on his recent marriage. Ivan Neilsen, of Phoenix Junior College, is now W6FIL. George Roverson of Phoenix is now W6FNN at Mesa. W6DRX is on 3500-kc. CW. W6EEJ rebuilds his 'phone every time he fails to raise a station called! W6DSQ has a daily schedule with Ames 'n Andy at 9 p.m. W6BCD flunked his commercial ticket exam. W6COI found that a mercury vapor '80M increased his plate voltage 75 volts. Bob Hopper, Sylv Lynn and J. H. Villian, all of Ajo, have sent in their papers to the RI. One of the operators of KFXV at Flagstaff will soon be on the air assisted by W6CPX-W6CDY. W6BEP is heard often. Out of town hams W6CVR, W6CAY, W6CBA and W5ZM dropped in on the SCM. W6BZO is back in Chandler. W6BFA keeps Mesa on the map. W6AMV is disposing of his entire radio equipment. Phil Hart, ex6CCN, is the new President of the Arizona Short Wave Radio Club, succeeding W6HS-

W6DKX, who had to leave us for his new territory amongst the Gulf states. W6EBP has his choice of a tuned r.f. receiver and a super-het converter. W6FGO has increased power.

Traffic: W6ALU 940, W6BJF 201, W6EUT 182, W6CKW 62, W6BVN 33, W6DRE 15, W6AEK 10, W6BYD 7, W6DOW 3, W6CQF 2.

LOS ANGELES — SCM, H. E. Nahmens, W6HT — *Los Angeles County*: Chief RM, W6ETJ, reports Trunk Lines E and F working like a charm. He leads the entire section in traffic. W6CUU takes our breath away with his unusually high total. W6CVZ pounds his way right up among the leaders. W6ACL handled lot of Shanghai traffic. W6BLS has been appointed OBS. W6CXW has lined up a Canal Zone schedule. W6AKW has a new 100-watt twin oscillator rig. W6UJ and W6ELV are working on 56 mc. W6HT is now located at 369 Roycroft. W6CUH is shoving a steady 850 watts into the Herta. W6CVF is arranging a special route to handle traffic for Veterans of Foreign Wars. The 'phone rig at W6TE is almost ready to go. W6EBK wants early morning eastern schedules. W6EKZ built 18 different transmitters. W6BPU is a new ORS. W6EEA sends code practice on 3575 kc. every night at 11:00 p.m. If it wasn't for the YL being up north the traffic at W6EUV would be pretty small. W6AM reports receipt of numerous 7-mc. cards. W6EXQ worked two new countries, Brazil and Borneo. W6BVZ has 160 watts input to his new MOPA. W6VO is stepping out in fine shape. The jinx visited W6CGP; first his antenna blew down and then all his '10s went west. W6CZT is now crystal-controlled. W6DZI reports QRM from street cars. W6BCK is back on the air. W6DSP is new Secretary of the Glendale Club. W6BVC has 740 watts input to the '04A in final stage. W6DQG is shoving 450 watts down the throat of a 211-D! W6BVI has portable W6FHM working FB. W6FT is on air at new QRA. W6BME is building a crystal rig. W6DNA says "skip" terrible. Norman Madsen of La Fiesta and Olympic traffic fame now signs W6FGQ. Congrats! W6ESA is figuring on remote control. W6ERL is getting good results on 7 mc. W6FDK, Secretary of the Monrovia High Frequency Club, sends in a group report: W6FDL has MOPA going strong. W6CTQ is building pentode receiver. W6BES is cutting up ether with new 50-watt job. W6FDK is rebuilding station. W6ELV is giving technical instructions to beginners. The following report for first time: W6FAL, W6DWP, W6EYJ, W6BVI, W6FDQ and W6FGQ. Reports also received from W6EQW, W6BVD, W6AKD, W6ON, W6ZZA, W6MA, W6DOZ and W6BLD. W6BJX and W6AML (Mr. and Mrs. E. O. Knoch) announce the arrival of an 8-pound Junior operator, born January 25th. Congrats, KH! A.R.R.C. members visited the new remote transmitter of KFL. The new officers of the Glendale Club are: President, W6DNF, Vice-President, W6AIQ, Secretary, W6DSP and Treasurer, W6DZL. *Santa Barbara County*: W6BZF is high point man for the county. W6DJS, Secretary, sends in a blanket report for the club: W6EDZ and W6DBJ are getting interested in traffic handling. W6FFC has been changing QRA. W6DFG is on with push-pull job. The Santa Barbara gang turned out 100% at the Section banquet in Pasadena. W6YAU promises stack next month. *Riverside County*: W6CFN-W6NF makes the BPL on deliveries. W6DLV is back after a leave of absence. W6FIQ, a new-comer, is on 'phone. A code class, open to all, is held every Wednesday night in the U.S.N.R. rooms at the Armory. *San Luis Obispo County*: Added school activities forced W6ALQ to resign his RM appointment. W6DWW reports. *San Bernardino County*: As this is written this bunch should be garnering plenty of traffic at the orange show. *Ventura, Mono and Inyo Counties*: Isn't there ANY life in this territory? There are hundreds of hams throughout the Section who do not report either traffic or activity! Drop the SCM a card on the 16th and help put our Section where it belongs.

— On the top!

Traffic: W6CFN 344, W6ETJ 520, W6CUU 257, W6CVZ 233, W6ACL 214, W6BLS 106, W6CXW 105, W6EQW 88, W6BZF 83, W6BVD 77, W6BYF 63, W6DLV 49, W6AKW 40, W6UJ 38, W6HT 37, W6CUH 36, W6CVF 33, W6TE 33, W6EBK 30, W6AKD 27, W6EKZ 27, W6ON 24, W6DJS 22, W6BPU 22, W6EUV 17, W6EEA 16, W6AWY

12, W6AM 10, W6ZZA 10, W6EXQ 10, W6BVZ 9, W6VO 7, W6CGP 7, W6CZT 7, W6FAL 7, W6DZI 7, W6BCK 6, W6DSP 6, W6DWP 6, W6EYJ 5, W6BVC 5, W6DQG 5, W6BVI 5, W6DDQ 4, W6DOZ 4, W6FT 3, W6BME 2, W6FGQ 2, W6DNA 2, W6ESA 2, W6MA 2, W6ERL 1.

SAN FRANCISCO — SCM, C. F. Bane, W6WB — Activity is at a high ebb this month. W6MV leads all comers. W6BNA is holding down trunk line schedules. W6NKK reports nice total. W6CIS is also holding down one of the trunk lines. W6CAL is now going to business college. W6ERK reports as per usual. W6DFR says traffic and activity rather spotty. W6YO reports once again. W6CZK burned out grid leak. W6DHE plans on putting in crystal. How about a report from ole Tom Babcock up in Eureka? W6ADK swapped his '52 for the makings for a low powered crystal rig. W6DZZ has been very busy with school. W6WM, one of the R.I.s, reports for first time. W6AZX gave report over the air to the SCM. W6HJ reports for first time in months. W6BVL finally got the crystal installed. W6DPF is back on with push-pull '52s. W6ZS is off the air awaiting license renewal. W6KJ and W6IU handle few messages. W6DWJ is going nicely.

Traffic: W6MV 338, W6BNA 155, W6NKK 101, W6CIS 71, W6CAL 63, W6ERK 43, W6DFR 40, W6YO 22, W6CZK 19, W6DHE 16, W6ADK 14, W6WM 10, W6AZX 9, W6HJ 11, W6BVL 9, W6DPF 11, W6KJ 5, W6IU 3, W6DWJ 2.

NEVADA — SCM, Keston L. Ramsey, W6EAD — W6AJP is high traffic man this month. W6CRF got a '52 and blew up his filter condensers and r.f. chokes. W6AAX has a 211. W6EEF is putting in an '03A. W6BTJ visited Santa Cruz. W6EAD has a new receiver. The Nevada Amateur Radio Assn. has a new transmitter under the call W6EDN. W6ATN has an FB crystal 'phone. W6MH at Las Vegas and W6BBB at Ely are heard frequently in Reno. Please send in reports, fellows. W6DST is putting in an '04A.

Traffic: W6AJP 153, W6AAX 69, W6UO 31, W6CRF 18, W6BTJ 25, W6EAD 6.

SAN JOAQUIN VALLEY — SCM, E. J. Beall, W6BVB — W6YB is maintaining schedules. W6EFP keeps U.S.N.R. drill schedule twice a week. W6AOA is still top man. W6CLP works ZL and VKs. Two new stations in Bakersfield are W6FKV and W6FJI. W6AME reports only 1% experimenting. W6BIP was active in the VE/USA Contest. W6CXT is holding down Merced. W6EPQ reports W6DEV again active. W6EUI-W6DFJ hands in a joint report which is full of Bakersfield items. W6BQC reports hearing France and Germany. W6KU and W6CLP renewed their ORS certificates. W6AHO runs up his total on 'phone. W6FFU and W6EKH are both after traffic. The following are on 1750 kc. twice a week, Tuesday and Thursday nights, at 1930 to 2100: W6BUZ, W6EKH, W6FFU, W6BRV, W6AME, W6BVB, W6AHO, W6EFP, W6ADB, W6DIY and W6CLL. Ask any of these boys how they like the 1750-kc. band.

Traffic: W6YB 103, W6EKH 3, W6EFP 71, W6AOA 444, W6CLP 37, W6AME 84, W6BIP 134, W6CXT 47, W6EPQ 18, W6EUI 56, W6DFJ 29, W6BQC 9, W6EXM 21, W6KU 23, W6AHO 43, W6FFU 121, W6BUZ 49, W6BVB 87.

SACRAMENTO VALLEY — SCM, Paul S. Farrelle, W6AXM — W6APJ has been appointed ORS, OBS, OO, and Trunk Line Station. W6EJC has been confined to his bed with a bum leg. W6CAW gave up his ORS. W6UM has low power rig working. W6LO staged a come back. W6EQU is back to his old love (low power). Ex-U6JQ is now signing W6AVA. W6BYB is putting in 750-watt Gamatron. Hi. W6AK and W6FW came out of hiding to attend club meeting. W6GF has been collecting parts for 1 KW crystal rig. W6CDC is getting the bug again. W6AUO is using M. G. W6QT sold his crystal rig to W6DZN. W6CGJ and W6TM were once the traffic stars of this section! W6AAC, W6AFU and W6AXM took part in Jan. ORS QSO Party. W6DVE would like ORS appointment. W6EOC had the money to buy tubes. But — there is a certain "YL"! W6ENC goes to college. W6DQG is using low-power 14-mc. 'phone. W6DKW is using his dynatron overtime. W6EMK is new OBS. W6DHE has been rebuilding. W6CCB is now at

Colusa. The SCM would like reports from: W6BDX, W6CSG and W6BHM. W6AHN joined the U.S.N.R. W6AVA and W6AXM are building up a live-wire U.S.N.R. Unit in Sacramento. W6GX has his outfit on 7 mc. W6DON was in auto accident. W6CMA is in line for ORS. W6DUL has trouble with BCLs. W6AVZ is a new call. W6AIM is one station that never forgets to report. W6BVK has an MOPA. W6EFM is out for traffic. W6FMX is latest addition to amateur ranks in Sacto.

Traffic: W6AFU 31, W6AIM 20, W6EJC 18, W6AAC 13, W6AXM 20, W6APJ 27, W6AK 46, W6AVA 13.

SAN DIEGO — SCM, H. A. Ambler, W6EOP — W6QA is high man for this month. W6BAM says ORS contest was FB. W5ZZI (portable of W5AHI) is now located at Bard, Calif. W6CTP turned in a nice total. W6ACJ has a new transmitter. W6AXV says traffic is picking up. W6EPW is building a big rack and panel set. W6AXN and W6AYK are looking for schedules. W6BCF is taking out an ORS ticket. W6CNC built a 56-mc. receiver. W6EFP is QRL work. W6BAS expects to be on 14-mc. 'phone soon. W6EFD and W6BEY are busy with 56 mc. A station was erected at the Imperial Co. Fair at Imperial under the direction of the El Centro Junior College. Considerable traffic was handled and much interest was shown by those attending the fair. W6ANY built a new transmitter to send to his brother in the Hawaiian Islands. The IPH expedition picture will be shown in El Centro soon. W6DDJ has added a '52 to his crystal rig. W6CXN is rebuilding. W6DAZ is operating at KXO. The Club Station at El Centro will be on soon with a new call.

Traffic: W6QA 125, W6BCM 78, W6BAM 40, W6CTP 27, W6ACJ 21, W6AXV 20, W6AXN 11, W6EPW 5, W6EOP 5, W6BCF 1.

PHILIPPINES — SCM, I. S. Liner, KA1SL — War activity put several of our stations on inactive list. KAINE is on Black Hawk in China. KAICM was busy on maneuvers. KA1SL took two weeks' training in Fort Santiago radio office. KA1HR is rebuilding. KA1NF, Air Corps op., is QRT. KA1UP coming along fine. KA1SP — slow but sure on traffic. OM2CJ, OM2FO and OM2CS are QRT and QRD U. S. A. OM2TG is going strong. KA1HR makes BPL as old standby. ExW3YD at OM1TB reports a good total.

Traffic: KA1HR 1681, OM2TG 118, KA1JR 90, KA1CM 107, KA1SP 6, KA1SL 37, KA3AA 5, OM1TB 192.

HAWAII — Acting SCM, C. D. Slaten, K6COG — The Oahu Amateur Radio Club is growing rapidly and now has twenty-eight members. The Hilo Radio Club is going strong with every ham on the island a member. Skip distance has made inter-island contacts poor on 7 mc. and general bad conditions have pulled the traffic totals down.

Traffic: K6BOE 36, K6IR 33, K6COG 25, K6AJA 23, K6DVZ 21, K6CRU 6, K6CIB 5, K6ERO 4, K6EDH 1.

ROANOKE DIVISION

WEST VIRGINIA — SCM, C. S. Hoffmann, Jr., W8HD — W8OK got water into his motors and consequently the A.A.R.S. almost died. W8ADI is organizing a U.S.N.R. Unit in Wheeling, and has as applicants: W8AAO, W8AZD, W8DJB, W8BWK, W8CBV, W8CSF, W8CWY, W8ELO, W8EOY, W8ECC and C. J. West. W8DPO made 1125 points in the W/VE Contest. W8AZD worked his first VK. W8HD had as visitors W8GB, and Ex-W4KF. W8BNJ is constructing crystal rig. W8EFO reports having a hamfest, which was attended by Ex-W8ACZ, W8BDP, W8FNS, W8FQB, Jim Ford and Mr. Stoneking. W8EL, Ex-W9BTM, brother of W8OK, is contemplating being ORS. W8BDD, W8BOW, W8CDV, W8CFB and W8FUM have been working on 7 mc. New hams reported: W8DRU, Catawba; W8FEO, Riversville; W8BKG, Weirton. Would like to have report from you fellows. New ORS: W8CSF, W8ELO. W8TI has been appointed Official Observer.

Traffic: W8DPO 29, W8CFB 11, W8BDD 8, W8BOW 5, W8EFO 5, W8CDV 3, W8CSF 3, W8FUM 3, W8AZD 2, W8ELO 2, W8TI 4, W8ADI 13, W8HD 14.

VIRGINIA — SCM, R. N. Eubank, W3AAJ — W3AGH keeps 14 schedules per day. W3FJ is now using several ops. W3AAJ was busy with Radio Week February 15th-20th. W3BSM is developing code speed by handling traffic. W3NT

is work
Portsm
worked
Observe
has dyn
ORS. V
Direct
letters.
3700 kc
sick. W
W3BTI
Pittsbu
W3BK
W3BAZ
W3FE
in Rich
air, 362
Februar
in atten
Miss W
W3BW
W3BM
W3CA
W3BRA
ules. W
local cl
W3CA
daily. V
W3HL
interval
ops. W3
has QR
reports
Ralsten
W3CH
ing to c
Norfolk
Traffic
132, W
113, W
62, W3
22, W3
10, W3
12, W3
W3BAC
W3BQ
NOR
— Send
We hav
W4IF b
month.
W4BD
Raleigh
when it
with a
tions. C
about 3
has bee
much. V
High Sc
Accordi
but all
be hear
OBS. W
complet
shack i
densers
State C
to build
Traffic
W4HS
W4AG
W4MR

COLORADO
SILVER
MOUNTAIN

April

is working lots of DX. W3AUG is Secretary of Norfolk-Portsmouth Club. W3AFT is leaving for California. W3ADJ worked "6" and "7" on 3.5 mc. W3ZU is active Official Observer measuring all Va. stations' frequencies. W3AMB has dynatron. W3QN is a real traffic YL. W3BAI is new ORS. W3CFL is building new transmitter. W3BZ, our Director, has been sick since Christmas. He would like your letters. W3AVR is keeping schedules. W3BSB is active on 3700 kc. W3AHV is now at Hopewell. W3BJX has been sick. W3QX, W3BAG and W3NT send nice reports. W3BTR worked West Coast on 3.5 mc. W3EJ has been to Pittsburgh. W3AEW built new transmitter at W3ANM. W3BKG is now located at Deltaville. W3RS keys antenna. W3BAN won high honors in Frequency Measuring Contest. W3FE got great kick out of Canadian Contest. Every ORS in Richmond took part in ORS Contest. W3BRY is back on air, 3620 kc. An enjoyable hamfest was held in Richmond on February 20th, at the close of "Radio Week." Among those in attendance were the following District of Columbia hams: Miss W3CDQ, Mr. and Mrs. W3BEG-ZD, Mr. and Mrs. W3BWT, Mr. and Mrs. W3NRR, and several from W3ASO. W3BMN is a real ole-timer. W3APT is rebuilding MOPA. W3CA is working on new rig. W3NE is getting started. W3BRA is operating at W3NT. W3BEV is arranging schedules. W3HJ at Franklin wants schedules. W3GY reports local club going fine. W3BGS is changing to push-pull. W3CAK has 'phone on at Jonesville. W3ZA is on 'phone daily. W3BRQ is building 100-watt P.P. rig. W3BWA and W3HL are active on 7000 kc. W3BEK is on at irregular intervals. W3BFT has FB crystal. W3CCL has two Navy ops. W3TM is building rig for Richmond schedules. W3AQK has QRM from college. W3ARD got crystal fever. W3PK reports QRM YLs. W3FP is busy earning shekels. Julian Ralsten at Covington has license. W3CEG, W3CGR and W3CHX are new stations in Richmond. W3WO is rebuilding to crystal. W3OM reports. W3CIE is new station at Norfolk. W3AOT is back on the air.

Traffic: W3AGH 418, W3FJ 274, W3AAJ 236, W3BSM 132, W3NT 117, W3AUG 117, W3CAH 115, W3AFT-YD 113, W3ADJ 96, W3ZU 70, W3AMB 69, W3OM 63, W3QN 62, W3BAI 61, W3CFL 61, W3AVR 29, W3CAK 26, W3BGS 22, W3BSB 18, W3AHV 18, W3BJX 17, W3QX 12, W3BTR 10, W3GY 10, W3EJ 55, W3AEW 10, W3RS 12, W3BAN 12, W3BKG 6, W3FE 9, W3BRY 9, W3BMN 4, W3HJ 4, W3BAG 3, W3APT 2, W3CA 2, W3NE 1, W3AGY 3, W3BQQ 2, W3WO 95, W3MT 5, W3CXM 407.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW — Send in reports, fellows, if you handle even one message. We have a new ORS, W4AGF. W4RE worked PA0LD. W4IF hooked an EAR or two. W4AAE has a fine total this month. W4AGD is getting the hang of traffic handling. W4BDI is a new ham in Greensboro. The new station in Raleigh was erroneously reported as W4AFI last month when it should have been W4AFJ. W4AVT keeps a schedule with a YL. W4MR is awaiting improvement in DX conditions. CM8AZ is old W4WU of Concord. W4TU is C.C. on about 3580 kc. W4EJ has built a new AC receiver. W4AEL has been trying numerous transmitting circuits. W4ABW has been fortunate enough to keep too busy to "Ham" very much. W4ZH says that the examinations in the Greensboro High School knocked several of W4AOE's operators cold. According to W4MI, the R.I. visited Asheville recently, but all the hams still have their licenses. W4AHS may soon be heard giving us the latest dope from Headquarters as OBS. W4TR is experimenting with 'phone. W4OC recently completed his 14-mc. 'phone. Lightning visited W4ANU's shack in February! Sangamo and Sprague donated condensers and American Sales donated a transformer to the State College Radio Club, and the members are getting ready to build a crystal controlled outfit.

Traffic: W4AAE 106, W4DW 90, W4AEL 59, W4MI 52, W4AHS 39, W4AVT 28, W4AOE 25, W4ATC 25, W4EJ 23, W4AGD 20, W4ZH 19, W4RE 14, W4TU 14, W4ANU 12, W4MR 4, W4ABW 3, W4IF 2.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, E. C. Stockman, W9ESA — The Silverton region has been snowbound and cut off from surrounding country. W9GNK was on the job for two days

and nights without a break while all lines were down. W9DBB is new station at Tacoma. W9AAB grabs off the traffic honors with a high total. W9DNP is putting in full time at KVOR. W9FPZ has a super-wasp. W9DQD has more time for radio now. W9EAM schedules W5OW and W9BNT. W9APZ reports radio conditions good. W9BTO is going back to low power. W9FXP has new AC receiver. W9HPY is second op at W9FCK. The Greeley Radio Club held election of officers with W9FQJ elected president. W9EDM is on 3.5-mc. 'phone. W9FQK is organizing a club at Wellington. W9CDE, W9CWA, W9EYN and W9BJN report.

Traffic: W9AAB 414, W9GNK 86, W9DNP 78, W9DQD 75, W9ESA 74, W9EAM 50, W9EYN 31, W9FCK 28, W9BJN 25, W9FXP 10, W9FPZ 8, W9CDE 7, W9BTO 4, W9CWA 2, W9APZ 1.

UTAH-WYOMING — SCM, C. R. Miller, W6DPJ — Good schedules put W1ZZA at the top of the list. W6DAM tried his luck in the International Tests. W6EXL worked KA1HR. W7AWG is getting out well. W7AAH is on 1.75 mc. W6BSE's plate supply went up in smoke. W6EYS received his Amateur Extra First ticket. W6BTX is very busy. W7ADF and W7AMU are rebuilding. W6DTB gets good results from his '10s. W6APM worked Japan.

Traffic: W1ZZA 275, W6DPJ 175, W6DAM 139, W6EXL 54, W7AWG 53, W7AAH 16, W6BSE 12, W6BTX 8, W6EYS 6.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Robert Troy, Jr., W4AHP — W4AJP leads the state in traffic. W4APU is back on the air. W4AWQ will soon be on. W4ALA is doing exceptional work with a low-power 35-mc. 'phone. W4ADJ is doing good work on 3.5 mc. There is a new ham at the U. of A., W4BDL. W4ASM is QRL. W4KP finds nearby schedules hard to keep on 3.5 mc. because of skip. W4AAQ was on the air some this month. W4ZX has his outfit going better now. Old 5ATP and W4AN is on now as W4AUD. W5AHP is getting out well with MOPA. W4AZH has his receiver going. W4RS is taking good care of the A.A. net. W4AP is trying out a 212D. What about you hams in Dothan and Mobile?

Traffic: W4AJP 74, W4KP 19, W4ASM 15, W4AZE 6, W4ADJ 1, W4ALA 12, W4AAQ 4, W4APU 1.

WESTERN FLORIDA — SCM, Eddie Collins, W4MS-W4ZZP — Route Manager, S. M. Douglas, W4ACB-W4PCN. Everyone had a real FB time at the hamfest held in Marianna sponsored by W4AUW, W4AUV and W4ASG. W4ASV won a pair of 216 Bs by telling the biggest lie. This month we report two new stations, ex4QT, who has applied for his license, and W4BCB, F. C. Nedley, brother of exW4ALH. We have a real live wire visitor here too, W8BGX. W4AXP has just been appointed ORS. W4AOO has moved to 1750 kc. W4AQY has been crashing out. W4QK lost his plate transformer. W4QU has a '45 'phone. W4AFT still pounds them out. W4ML is our newest 'phone. W4AUA now attends the U.S.N.R. drills. W4QR-W4AQG has declared a Hi-power holiday since he broke his 50-watt. W4SC keeps getting better and better. W4SZ has been QRL W. U. work. W4OE has been busy getting WCOA ready for a change of QTH. W4FV has some new '66s. W4FV-W4ZZR has been getting ready for the DX tests. W4ABJ was home for a few days. W4VR has his AC receiver ready. W4ALJ is on a U.S.N.R. cruise in the Gulf. W4ASV is awaiting his station license. W4ATN gets out FB on 14,000 kc. W4KB says that they (OM and XYL) have just about ironed out all the kinks in the crystal-controlled 'phone. W4AGS still pulls in the DX. W4ART and W4ARV spend hours rag-chewing. W4UW-W5NO was relief operator at WCOA. W4AXF is marking time with her 'phone and getting ready for 1750-kc. work. W4ADV and W4AWJ have just about forgotten there is such a thing as ham radio. W4MX is seen every once and a while. W4AUW changed QTH. W4AUV is just getting over the hamfest. Hi. W4ASG is still off the air. W4FV-W4ZZR worked some FB European DX. SH-H-H, sometimes W4PCK is operated by an XYL. We understand W4AAX is in Virginia. W4ATF was a visitor to Pensacola. W4MS-W4ZZP is on 3560 kc. with crystal. We would like to hear from W4ARD-W6FCY. Let's have a

larger traffic total next month. Also, we need a couple Official Observers. Who is qualified?

Traffic: W4FV 82, W4ACB 4, W4AXP 9, W4KB 24, W4AQY 2, W4UW 47, W4QU 8, W4ATN 10, W4ARV 4, W4ART 2, W4AUW 13, W4AUV 8, W4QR 5, W4ASV 3, W4ALJ 1, W4AXF 2, W4AGS 8, W4QK 1, W4AFT 1, W4AUA 2, W4MS 19.

EASTERN FLORIDA — SCM, Ray Atkinson, W4NN — W4AKO steps out with the highest total this month. A close second is W4AFV. W4BDD sends his first traffic report. RM W4CI reports that Tampa will take traffic anytime. W4AII says that portable transmitters were used at the Air Races there with success. The Jacksonville Amateur Ops. Club installed transmitters at the Annual Air Show there, using portables, 'phone and CW, with great results. W4AXY is building crystal P.P. W4FZ is conducting experiments with crystal circuits. He is ably assisted by W4GM. W4BBB gets results using low power. W4AKO is putting in a '60. W4VP reports two new stations in Daytona Beach, W4BDM and W4NK. W4GS installed armature and is back on the air. W4TK-W4AKL are two busy boys. W4HZ is now a proud father. W4HY has a new '52. W4AWO is working lots of DX. The "JAROC" Club of Jax. wins this month's heat in the Wouff-Hong Trophy Contest with a total of 220. W4WJ has new P.P. W4DT reports that W4AGP has trouble with his MOPA. W4AQI built a new AC receiver. We don't hear much from W4AGR. We sure hope W4ABL recovers soon. W4RO and W4TB will soon be on the air. W4BBN is a new ham in Tampa. W4NN and YF, W4AGB, visited W4EY, W4SY, and W4VU. W4AZB has a new rig. W4UX built a new crystal job. W4UJ is off the air temporarily. W4MF and W4NN have been experimenting with new types of aircraft transmitters. W4DE won the traffic contest for February at Jacksonville. W4AER has a good portable. W4KW has a new MOPA. W4AOT is rebuilding. Let's try to boost the old total next month, fellows.

Traffic: W4AKO 87, W4AKV 49, W4AWO 42, W4DE 45, W4ALI 39, W4AGN 39, W4NN 32, W4VP 30, W4AJX 30, W4GS 29, W4ABZ 30, W4AER 27, W4FZ 22, W4AKH 15, W4GM 10, W4PI 10, W4UX 10, W4AFV 8, W4DT 6, W4BBB 6, W4BDD 6, W4MF 5, W4AZB 4, W4HY 2.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS — SCM, J. C. Hagler, Jr., W4SS — CM8YB leads the traffic list with K4RK second. FB! CM8UF has been transferred to the U.S.S. *Vestal*. K4JA is a new Ham. CM8AZ sends in a fine total. W4SM is showing the way for the A.A.R.S. W4AAY has a 7-mc. rig. W4APG is a new member in Ft. Benning. W4ABS is off for a time. Art Hanson, exW8DXM, is one of the Ops at W4HU and W4UO in Ft. Benning, Ga. W4GT is back on the air. W4KR, famous in other days under the call of W4DT, has returned to the air. W4BAR is getting out FB with his 'phone. W4BED, W4BDA and W4SD are new hams in Augusta. W4AQN is making plenty of QSOs with his 'phone. The membership of the Augusta Radio Club is increasing rapidly. W4DV is taking the members for a trip down the Savannah River on his boat.

Traffic: CM8YB 186, K4RK 125, CM8AZ 114, W4SM 39, W4AAY 14, W4HU 13, W4DV 9, W4GT 3, W4AJH 3, W4BW 2.

WEST GULF DIVISION

NEW MEXICO — SCM, Jerry Quinn, W5AUW — W5AOD is doing well as a traffic man. W5EM reports the reporting habit. W5ASR is on 'phone. W5AOE reports two new 'phone hounds, W5BVC and W5ACP, in State College. W5AUO sends in his first report. W5BVC is a new ham in Clovis. W5BUY is on the air again, as is W5BHY. W5AUW is using Hi power. W5AXV will be on soon. Let's keep the traffic totals high, OMs.

Traffic: W5AOD 507, W5AUW 398, W5ZM 41, W5ASR 6, W5AOE 4, W5AUO 4, W5BVC 2.

SOUTHERN TEXAS — SCM, H. C. Sherrod, Jr., W5ZG — Houston: W5TD is getting out well. W5BHO is using 'phone on 3520 kc. W5EI is second operator at W5BHO. W5BTD has a 56-mc. rig going. W5BKW uses two fifties in push-pull. W5CA has crystal rig going. Same for W5VA. W5ADZ is on. W5ANW is using 'phone. Huntsville: W5DS has moved here from Baytown. Corpus Christi:

W5AB reports from aboard the S.S. *Swiftlight*, KDSA. W5MS sends official broadcasts on 3.5 mc. College Station: W5AQY has been in communication with Japan, South America, and Australia and New Zealand. Austin: W5VV is working on 7100 kc. W5CT is bemoaning the loss of his pal, W5ATW, who has taken unto himself a spouse and returned to Harlingen. San Antonio: W5CCF is working in the 7000-ke. band. W5MN reports a very nice traffic total. The San Antonio Radio Club, on February 9th, put on a program over KMAC which was very cleverly staged. W5RV, W5OW, W5CAS, W5BQH, and W5MN are on the air every day. W5CS is building a 75-watt crystal rig. W5BKI is rebuilding. W5EU is on Tuesday nights only. W5ABQ is on whenever he has the opportunity. W5AX will be on shortly with a '10. W5UX has a '61. W5VL and W5JC are off temporarily. Miss W5CBW is moving to new location. Incidentally the input at W5BVG has never exceeded 8 watts. W5CD, W5CAP, and W5AWY are newcomers. W5BUV has a 50-watt MOPA. W5RV has a new REL 278 receiver. Port Arthur: W5AWN is a new reporter. El Paso: W5NT is the new O.O. W5ES sends in a nice report. W5AAU is on the wet side of the river at XEQ. W5BL is, unfortunately, on the dry side at KTSM. W5AEC is applying for OBS appointment. W5AEP is on occasionally. W5AFN is on less frequently. W5AFS is sick. W5AOT is handling traffic. W5AUZ is awaiting operator's license. W5BAD is busy. W5BCD has no antenna. W5BNJ still has the RAC note. W5BOD and W5DE are rebuilding to crystal. W5BQU will be second op at OBS W5AEC. W5CAW was heard in New Zealand. W5FW is moving back from remote control. The El Paso Radio Club held a banquet at which 23 were present. Coolidge: W5BRZ is another newcomer.

Traffic: W5MS 7, W5BRZ 28, W5BUV 23, W5RV 24, W5BVG 8, W5AEC 5, W5AOT 32, W5BNJ 5, W5BQU 21, W5ES 14, W5FW 173, W5MN 248, W5CCF 21, W5CT 32, W5VV 36, W5AQY 50, W5AB 20, W5DS 22, W5BTD 6, W5BHO 34.

NORTHERN TEXAS — SCM, Roy Lee Taylor, W5RJ — W5WW runs away with the honors again this month with our Route Manager, W5AUL, a close second. W5QA received a nicker for a QSL from Halifax, N. S. W5AVF handled death message and an order for an airplane "Prop." W5BII says, "Hoorah for North Texas." Hi. W5HY pounds away as usual. W5BTU reports several new prospects. W5BXV lost an aerial pole in a recent wind storm. W5CF Sr. has a new monicker this month. "The Royal Printer of the Monthly Sparks," which is a FB bulletin put out monthly through the courtesy of W5AUL, W5CF and reports furnished QST by W5RJ, the SCM. W5BYF says thanks for sparks. W5BJX reports QRL service work KGKO. W5AJG fell off the fence while putting up new sepp. W5AZC reports batteries down. W5BXW says there is no such thing as economical crystal control. W5AID reports visiting W5AZN. The W.F.A.R.C. reports through their excellent Secretary-Treasurer, Mrs. E. B. Martin, that plans are going forward for the annual banquet in April. W5BZT reports a schedule with LAIS. W5AXK has done a little of everything this month. W5BII reports for W5IZ a station close to Dodd City, and says W5QU is still at A-M College. W5BOC of Lampasas is a new reporter. W5AWT was busy at work. W5BYP comes through again. W5IT of McKinney is another new reporter. W5BCW expects to have a 30-watt rig going soon. The station at the Southwestern Exposition and fnt Stock Show to be held in Ft. Worth, March 5th-17th, will use the call of W5VE instead of W5DZ as reported last month. The ORS appointments of W5LY and W5QU are being cancelled for various reasons. All cancellations are for the benefit of the Section and may be reappointed after three months if traffic handling justifies same. W5WP is on in Ft. Worth again. W5BNO is trying to get an '03A job. W5AGQ-W5AVS are still on. W5WZ is now in Dallas. W5ARK is on 1750 kc. 'phone as are W5BA and W5LU. W5AAM plans on a 14-mc. 'phone rig soon. W5BYO has an MOPA. W5ARV says Key Clicks about gone. W5QY is putting in 2 '32s. Old time 5TL of Azle will soon be signing W5TL with a modern crystal rig. W5ADN is heard occasionally. W5APW has a brand-new National, as has W5AYG. W5AL reports things slow. W5RA reports for W5NW by W.U.

Traffic:
77, W5H
30, W5RI
W5AXK
W5IT 22

NOVA
EX
SILVER
STATION
cards cho
pice this
division!
via VE1H
through V
through V
VE1AL h
New man
has cryst
VE1DV
me. VE1
Paul's tel
with main
is in line
about 500
01A. VE
We on 10
W610.
has YL C
Route Ma
is taking
VE1CG a
Frederic
50-watt
great res
VE1BG r
Traffic:
12, VE1D
10, VE1E
NEWF
V08AW -
have also
V08AE f
brother in
FR. V08Z
a new Zep
who keeps
Traffic:

ONTA
gratifi
VE3GT, a
an old-tim
ing out hi
rebuilding
with stud
VE3MR a
is going
to report
VE3TM i
get good
VE3HW
experimen
the sepp.
ham in Ni
and VE3A
VE3TT al
VE3CP al
report. V
VE3DB is
ceiver. VE
VE3NY i
VE3VA,
VE3JN, V

Traffic: W5WW 344, W5AUL 313, W5AVF 128, W5BII 77, W5HY 52, W5BTU 48, W5RJ 36, W5BNY 32, W5CF 20, W5RH 17, W5BYF 7, W5BJX 6, W5AJG 6, W5AID 10, W5AXK 28, W5IZ 20, W5BOC 25, W5AWT 3, W5BYP 26, W5IT 22, W5AL 7, W5NW 45.

CANADA

MARITIME DIVISION

NOVA SCOTIA — SCM, A. M. Crowell, VE1DQ — **EXTRA!** C. S. TAYLOR, VE1BV, WINS C.H.N.S. SILVER TROPHY FOR MOST ACTIVE MARITIME STATION DURING PAST YEAR. VE1BV submitted cards showing 800 QSOs during the year. He also sets the pace this month with the highest total in the history of this division! Route all eastern 3.5-mc. traffic to Newfoundland via VE1BV-V08Z and all western Canada traffic via VE1BV through VE2AP. All Cape Breton gang may send in reports through VE1BM. VE1CO schedules VE1AL and VE1BM. VE1AL has raised his input. VE1BN is on 3.5-mc. 'phone. New man in Glace Bay on 14 mc. is VE1DI. VE1DM now has crystal on 14 mc. VE1DR is still pounding away. VE1DW (exVE1DA) sends in fine report. VE1BR is on 14 mc. VE1AX handles traffic on 3.5 mc. to VE1CD, St. Paul's Island, via VE1AZ. This is their only good contact with mainland, as mail arrives only once a month. VE1ER is in line for ORS. VE1AG worked VE1CL, a distance of about 500 miles, with 'phone using only 45 volts on plate of 61A. VE1CO at P.E.I. has been getting good reports from Ws on 14 mc. VE1DQ has schedules with W6AKD and W6DIO. VE1BY is R.I. and going strong on 14 mc. VE1CK has YL QRM. New Brunswick — W. A. Kelso, VE1AE, Route Manager for N.B., has reorganized his crew. VE1CY is taking a shot at DX. VE1DT is new man at Bathurst. VE1CG and VE1BQ are on 3.5 QRA St. John. VE1AM at Fredericton. New man at Moncton is VE1DP. VE1DC's 10-watt 'phone is getting out FB. VE1CL has been getting great results on the old 1750-ke. 'phone band. VE1AU and VE1BQ recently visited the St. John gang.

Traffic: VE1BV 166, VE1AE 136, VE1CY 37, VE1AX 12, VE1DQ 8, VE1ER 11, VE1CO 20, VE1AL 10, VE1BM 10, VE1DC 7, VE1CL 4.

NEWFOUNDLAND — Acting SCM, James Moore, V08AW — V08MC has a beautiful signal on 3.5 mc. We have also heard V08AN on 3.5 mc. Nobody has heard V08AE for over a month. V08WG had a QSO with his brother in Montreal, whom he has not seen for ten years. FB. V08Z reports plenty of activity. V08AW is waiting for a new Zepp. Traffic for VO may be routed through VE1BV, who keeps a reliable schedule with V08Z.

Traffic: V08AW 10, V08Z 92.

ONTARIO DIVISION

ONTARIO — SCM, H. W. Bishop, VE3HB — It is very gratifying to see the traffic totals still increasing. VE3GT, as usual, has the highest total. FB, Sam, VE3IB, an old-timer, reports again. VE3GX had bad luck in burning out his transformer and rectifier. VE3AD will be QRL rebuilding. VE3DW has bought more filter. VE3CD is QRL with studies. VE3GP and VE3WF report from Windsor. VE3MR says VE3ET will be with us again soon. VE3AU is going on the inactive list until June. VE3JI promises to report every month. VE3HV has his MOPA working. VE3TM is on 3640 kc. with crystal. VE3LM says they both get good reports. VE3QB is getting some good QSOs. VE3HW sends in a very interesting report. VE3BP is experimenting with 56 mc. VE3HM is having trouble with the zepp. VE3IG is an applicant for ORS. VE3JS is a new ham in Niagara. VE3HN is QRL Varsity. VE3HA, VE3GB and VE3AW are attending Marconi School at Toronto. VE3TT and VE3ZQ had a good time in the W/VE contest. VE3CP also applies for ORS. VE3HZ comes with his first report. VE9AL reports regularly. VE3IJ reports traffic. VE3DB is busy rebuilding. VE3IR is building new SG receiver. VE3IX has moved outfit to basement, and says VE3NY PEMBROKE pounds in there on schedule. VE3VA, VE3MM, VE3KJ, VE3LR, VE3LL, VE3JM, VE3JN, VE3GI and VE3BJ are pounding brass nightly.

VE3PN tells us that VE3VA, formerly VE2BT, is on the air. VE3BC is after DX. VE3HB has had a tough time with all the family sick. Let's have a report from every VE3!!

Traffic: VE3GT 1063, VE3GX 391, VE3AD 202, VE3DW 150, VE3CD 135, VE3WE 124, VE3MR 113, VE3GP 105, VE3IG 107, VE3CP 102, VE3LM 87, VE3BC 83, VE3ZQ 78, VE3JI 74, VE3HB 55, VE3AU 54, VE3IJ 41, VE3IR 37, VE3HW 30, VE3TM 21, VE3IX 11, VE9AL 10, VE3BP 10, VE3JS 7, VE3IB 7, VE3HV 7, VE3BG 8, VE3PN 6, VE3HM 4, VE3QB 2, VE3DB 1.

QUEBEC DIVISION

QUEBEC — SCM, Alphy Blais, VE2AC — A hamfest held by the South Shore Radio Club met with a huge success. VE2BE, VE2HV and VE2BG dispense the humorous part of the program on such occasions. VE2DS is parked on 1.7-mc. band. VE2DR is on the way to becoming a star station. VE2BC is in Shawinigan now. VE2AA was busy with the W/VE contest. VE2AP keeps a flock of morning schedules. VE2BB never tires of radio. VE2CA is to be e.c. soon. It is with regret that we record the passing of a kind-hearted amateur, VE2AF. Such a lively person and true amateur will be missed by all. VE2DW is doing nicely for a beginner. VE2BE, VE2HV are chewing the rag on 'phone. VE2AC is still working at 28-mc. equipment. Is it possible to arrange for a group photo of the Quebec Section amateurs? Please offer suggestions.

Traffic: VE2AC 156, VE2AP 134, VE2BB 106, VE2DR 96, VE2CO 32, VE2CU 24, VE2CX 16, VE2AA 16, VE2CA 5, VE2DS 4, VE2BC 1.

VANALTA DIVISION

ALBERTA — SCM, Fred Barron, VE4EC — VE4JQ sends a good report. VE4DQ reports with traffic. VE4HM has his crystal perking on three bands. VE4DT is still pounding away. See his total. VE4GY reports a QSO with Brazil. Wanted, reports from every VE4 in Alberta!

Traffic: VE4DT 147, VE4HM 17, VE4DQ 15, VE4JQ 30. **BRITISH COLUMBIA** — SCM, J. K. Cavaleky, VE5AL — VE5HP is our Route Manager. If you have any schedules, please keep in touch with him. VE5AG made a nice total. VE5AC takes traffic on one band and shoots it out on another. VE5AL has put his shack in shape. VE5EH has a new receiver. VE5DV is migrating to 3500. VE5HR lost his antenna during a windstorm. VE5EC had a funeral for his oscillator. VE5CT is back in the flock. VE5JN and VE5JC will be on shortly. VE5BR and VE5BL stick to 1750 for their schedules. VE5FG sent his total in via radio.

Traffic: VE5BL 10, VE5AC 27, VE5BR 27, VE5FG 86, VE5EH 8, VE5HR 9, VE5HP 131, VE5AL 23, VE5AG 102, VE5EW 48.

PRAIRIE DIVISION

MANITOBA — SCM, John L. Green, VE4BQ — VE4IS turns in a nice traffic total. VE4DK has been active on 14 mc. VE4AG built a new A.C. receiver. VE4CI gets out very well. VE4DJ, the Nighthawk, is out for real DX. QRU from VE4IU and 4AE. VE4BQ has been on 7 mc. VE4IS, VE4DK, VE4DJ and VE4BQ all claim they are going to win the DX contest this year. VE4GL has discovered his trouble — a broken feeder wire. Hi. VE4KJ has come on the air and operates on 7 mc. VE4IC is using 7 mc. VE4CP is using crystal. VE4GQ has acquired two 250-watters. VE4FT is heard on 14 mc. We would like to hear from VE4BU and VE4AC.

Traffic: VE4IS 70, VE4DK 34, VE4DJ 22.

SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — We have two new stations reporting traffic for the first time, VE4EL and VE4HX. VE4EL was in on the VE/W contest. VE4FC is now tuning a better receiver. VE4IH came to light again. VE4HX is looking for schedules. VE4AV has a new set of tubes. VE4BB is trying to schedule Toronto on 14 mc.

Traffic: VE4BB 64, VE4IH 67, VE4EL 34, VE4HX 9, VE4AT 5, VE4AV 2.

• CORRESPONDENCE •

The Publishers of QST assume no responsibility for statements made herein by correspondents.

Importance of Cooperation

Henning, Minn.

Editor, QST:

Your editorial in the February issue of QST struck me as being particularly to the point and should impart no small amount of lacking education to a goodly number of our A.R.R.L. members and amateurs at large. Particularly do I refer to those 'phone boys who thought that the whole 'phone problem could have been solved in about the same time that it takes to work out the average cross-word puzzle. Your idea of comparing the 'phone situation to Prohibition is very striking, since we are all aware of the tremendous difficulties and obstacles which are being encountered in an almost vain effort to put the U. S. A. on a pillar, high and dry. An immediate solution and/or relief in either problem is absolutely an impossibility. It just simply cannot be brought about in one day, one week, one month or one year, and in all probability never will be entirely without further difficulties.

Coöperation and confidence are two of the vital essentials of any undertaking, be it amateur radio, business, pleasure, sport or love. If we have one, it almost invariably follows that we have the other, and all concerned are mutually benefited. If you don't believe in coöperation, just watch what happens to a wagon when one wheel comes off! Illustrating, just see what happened when that small group of "over-ardent 'phone amateurs" filed their objection! As you say, it threw a short-circuit on the whole works, and as a result the wheel had to be put back on the wagon before the thing was under way.

During my term as Dakota Division Director, 1930-1931, I had correspondence with amateurs all over the U. S. A. on the 'phone problem. In my correspondence with them I tried to bring out the very same points that your editorial did in such a masterful fashion. Those who were broad-minded enough to see more than one side of the question were easily convinced that the A.R.R.L. was doing every possible thing to help the 'phone man. Those who were not that broadminded were undoubtedly enlisted in the cause that temporarily pulled the wheel off the A.R.R.L. wagon at Washington!

When President Maxim appointed the committee to work "overtime" on the 'phone problem at the 1931 Board meeting, I firmly believe that he chose wisely. The committee members

were from divisions whose 'phone interests differed. They were men who saw the situation from every angle, weighed the advantages and disadvantages of one against the other, and who were unbiased and impartial in arriving at their decisions. The solution that this committee offered to the Board the next morning, which has just been enacted by the Federal Radio Commission, I am sure is to be productive of the greatest good to the greatest number, at least for the time being.

In closing, will you permit me to disagree with you most emphatically on one point, Mr. Warner? Okay? Thanks! The disagreement is on the last sentence of your editorial. We must face the world *always* as just one group of radio amateurs, all for one and one for all.

—Cy. L. Barker, W9EGU

QSL Forwarding by Supervisors

Department of Commerce,
Radio Division, Washington

Editor, QST:

The Division has been advised by its Supervisors that many amateurs throughout the United States are forwarding to them QSL cards for them to furnish addresses and forward these cards to the amateur stations indicated thereon, and further that these cards are not accompanied by postage for such forwarding.

The Division's appropriation does not permit the purchase of postage stamps for the forwarding of mail matter. Accordingly, such Supervisors as are free-forwarding these QSL cards are doing so at their personal expense, which does not appear to the Division as a proper procedure. Therefore, it is suggested that some mention be made in QST indicating the necessity of furnishing sufficient postage for the forwarding of QSL cards, when making requests that the Supervisors furnish addresses for such cards.

—W. D. Terrell, Director of Radio

"Three Times Three"

728 Second St., Henderson, Ky.

Editor, QST:

Far be it from me to criticize A.R.R.L. policies, but I must air a simple opinion concerning operating procedure.

Calling CQ "three times three" is probably as old as the A.R.R.L. itself. Maybe "three times three" was originated when receivers used five

ALL CONTINENTS! ALL DISTRICTS!

EGYPT ★ GERMANY ★ FRANCE ★ SPAIN ★ JAPAN ★ ARGENTINA
HOLLAND ★ AUSTRALIA ★ ALASKA ★ RUSSIA ★ ITALY ★ ENGLAND

We have in our files absolute proof of world wide reception enjoyed with the Gross HAWK short-wave receiver. We are receiving letters daily from enthusiastic HAWK owners who have listened to all parts of the globe!



The HAWK SHORT WAVE RECEIVER

Remember!

ALL DISTRICTS AND WORLD WIDE RECEPTION ACTUALLY HAS BEEN ENJOYED WITH THE GROSS HAWK!

While you are at it drop us a card for complete information on the HAWK!

SCREEN GRID R.F. Uses 236 Auto type 6-volt screen grid	SCREEN GRID DETECTOR Uses 236 Auto type 6-volt screen grid	PENTODE AUDIO Uses 235 auto type 6-volt Pentode
--	--	---

Filaments may be heated with 6-volt transformer. Completely assembled, wired and tested, including plug-in battery cable and set of three coils covering range of from 17.5 to 110 meters.
A set of matched tubes tested in your set.....\$3.60
6-volt filament transformer.....1.75

\$22
Only

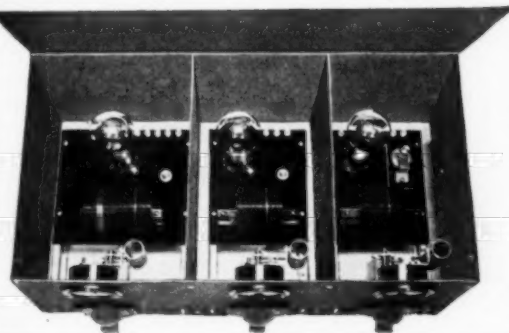
BEWARE! CONSIDER THIS BEFORE BUILDING

It won't be long now! Rulings are becoming more stringent every day. (See page 42 March QST licenses revoked for off frequency operation.) Self excited transmitters will soon be a thing of the past — save yourself disappointment and money.

Use a crystal controlled job at less than the cost of the old fashioned jobs. GC-30 assembled kit — crystal control Pentode oscillator — 210 buffer — 210 amplifier in beautiful black crystallized finish battleship construction hinged cover cabinet.

COMPLETELY ASSEMBLED
READY FOR YOU TO WIRE WITH
THREE READRITE METERS **\$29.50**

A post card will do! Drop us a line and we will be glad to send you complete information on the GC-30 transmitter.



BILEY QUARTZ CRYSTALS

After much experimentation we have chosen the Biley crystals as outstanding for accuracy and genuine quality. Large stock always on hand for you to select from. Crystals for the 80-meter and new phone bands.....\$5.50

"HAWK, JR."

Appearance identical with the HAWK, uses same cabinet and dial, uses same tubes — but without R.F. stage. Wound bakelite coil forms supplied instead of Isolantite coil forms. Completely wired and tested. A Corking receiver in spite of this very low price, only **\$14.75**

NATIONAL RECEIVERS AND PARTS complete line
NATIONAL EQUIPMENT including NEW NATIONAL COILS

A COMPLETE LINE OF STANDARD AND "HARD TO GET" PARTS

"JERRY'S PLACE"

25 WARREN STREET, N. Y. C. TELEPHONE BARCLAY 7-6698



Say You Saw It in QST — It Identifies You and Helps QST

Make a FUTURE of your Hobby!

...complete your knowledge by study at RCA Institutes... the only schools associated with largest, most complete research laboratory in radio industry.



YOU'VE probably often thought you'd like to increase your knowledge of radio... in a way that may bring you worthwhile returns. RCA Institutes suggests that opportunity... for with study here you may make a future of your hobby!

You can learn any of these highly interesting branches of radio... aircraft radio, broadcast station or studio, direction finder or radio compass, disc and film recording, servicing home entertainment equipment, television... and many others. You study both fact and theory — and at the same time enjoy the advantages of RCA Institutes' association with the largest, most complete research laboratory in the radio industry.

4 Complete Resident Schools

Resident schools at New York, Chicago, Boston and Philadelphia offer thorough elementary and advanced courses in practical radio. Courses based on 22 years' experience... added to and revised as new developments are perfected. Advanced methods of instruction by outstanding teachers.

Win Radio Scholarship

RCA Institutes Extension Courses enable you to study at home. Capitalize your spare time. Special laboratory equipment furnished. Also extension graduates receive two weeks' instruction at resident schools. Outstanding graduates of extension courses are eligible for free scholarship in advanced courses at nearest resident school. Tuition costs for all courses moderate. Tear out and mail the coupon today for free general catalog, full details.

A Radio Corporation of America Subsidiary



RCA INSTITUTES, INC.

Dept. ST-4, 75 Varick St., New York

Please send me your General Catalog.

I am checking below the phase of radio in which I am interested,

- ☐ Aviation Radio ☐ Talking Pictures ☐ Television
☐ Broadcast Station or Studio ☐ Disc and Film Recording
☐ Servicing Home Entertainment Equipment
☐ Radio Operating

Name.....

Address.....

Occupation..... Age.....

stages of audio just to hear the other fellow sign. It is a rare thing to hear a station use actually the 3 by 3 any more. If he has a small set he wonders why he doesn't get out. With a blunt lead pencil you can figure it out: Using a call like W9KCO he is transmitting his call about 80% of the time and the CQ is heard about 20%. If another operator is listening for a CQ he generally passes over stations transmitting calls, thinking they are calling someone when they are really signing. Granting a lot of exceptions, the 3 by 3 CQ'er has about two chances in five of making contact, with any one operator tuning for a CQ.

Time and speed should count, too. And things have speeded up on c.w. since the bug has come into common use. (And you will pardon me for mentioning that some bugs have come into very common use.) An op sending 20 w.p.m. can send six CQ's while his slower brother sends three at 10 w.p.m. (astounding arithmetical conclusion). Selah! Why not "four times two?" Four CQ's, two signs, repeated four times. At 18 w.p.m. this procedure takes only a single minute using the longest call the U. S. has. If conditions are such that an op cannot distinguish a call sent twice, a satisfactory contact cannot be made.

Another thing — we hear "Sign your call frequently when calling a station." An operator answers a CQ and "signs frequently" during the call. He does not raise the party; in fact the other party does not answer any one. The answering operator promptly thinks his 204-A is a dud. Tear it all apart and find out why the two parties didn't QSO. The first op finishes his CQ and starts up the dial listening for his call. He hears fifteen or twenty other calls that he naturally passes over. At the instant that he heard the signal of the other party calling him, that party *was* signing... and the CQ'er passes him up unaware that he was getting an answer to his CQ. Certainly, if he had listened long enough he would have found out, but just try listening to every call, sent through probably twice, while going up the band and see what time it is when you reach the center of the band. So isn't it best to answer a CQ by calling the other's call and *only* his call for from one to two minutes (depending on various circumstances) and then sign two or three times? Q. E. D.

— Geo. P. Taylor, W9BAN

No Use Fighting It!

Seaforth, Ontario

Editor, QST:

I just received your circular wondering why my subscription hasn't gone in, and asking reasons for my non-renewal.

In the first place, for the last ten years or more I have been regularly knocked out of four or five hours of good sleep one night in each month. In spite of my efforts these attacks have not diminished — rather increased — until I have resigned myself to the will of Fate and am reconciled to carry this cross ad nauseum. What is this menace? Ha! "Quite Sans Terminer."

SOLID MOLDED RESISTORS

FOR MOTOR CAR RADIO



FOR CONSOLE RADIO



Do Your Sets go "Sour" in Service due to poor Resistors?

The satisfactory operation of your receivers depends to a great extent upon the accuracy of your fixed resistors. Bradleyunit Resistors are used by the world's largest radio manufacturers, because their resistance value is stable under varying conditions of load, temperature, and moisture. They are not subject to wide fluctuation due to long use. Don't risk the reputation of your receiver with poor resistors. Get an Allen-Bradley quotation on your next order.



Type A, Single
Bradleyometer



Type AA, Double
Bradleyometer

BRADLEYOMETERS

The Bradleyometer is a potentiometer with approximately fifty solid resistance discs interleaved between metal discs.

The total number of discs can be arranged in accordance with any resistance-rotation curve.

One or more Bradleyometers can be arranged to operate with one knob. Mixer controls, T-pad and H-pad attenuators and other complex controls can be provided.



Type AAA, Triple
Bradleyometer

Interference from ignition systems in radio-equipped motor cars is suppressed with Bradley Suppressors. When used with suitable by-pass condensers in ignition circuit, shielded ignition cables are unnecessary.

Bradleyunit Resistors are made in five sizes, with or without leads, and are color coded to meet set manufacturers' specifications. These solid molded resistors are accurately calibrated and have great mechanical strength.

Allen-Bradley Co., 108 W. Greenfield Ave., Milwaukee, Wisconsin

ALLEN-BRADLEY RESISTORS

Produced by the makers of Allen-Bradley Control Apparatus

Say You Saw It in QST — It Identifies You and Helps QST

NEW!

Special plate supply
for Class "B" Amplifier



T-5140 Special Plate Supply Transformer—black crackle finish. Size 6 1/2 x 6 1/4 x 10 1/2. List Price \$24.50.

THIS special and entirely new plate supply transformer, T-5140, is designed for use with Class "B" amplifier. When used in the recommended circuit it supplies practically constant output voltage at the filter terminal over the rated load range.

In addition to the special plate supply unit, we offer for coupling transformers a special Input T-5100, and a special Output T-5101. Tube replacement economy and high efficiency justify your immediate investigation. Thordarson circuit diagrams S-102 and S-108 sent free on request.

Thordarson Electric Manufacturing Company
500 West Huron Street, Chicago, Illinois

THORDARSON
TRANSFORMER
SPECIALISTS
SINCE 1895...

When I lie down to sleep I see staring me in the eye and grinning devilishly, my "five-foot shelf" of *QST*'s. I hear the insistent voices of Lamb, Grammer, Chinn, Handy and the older but still lusty voices of Reinarts, Wallace, Ballantine, Kruse, Hatry, Schnell, calling and pleading, "Come on Ed, it's only eleven o'clock! You know you want to investigate our opinions on Hertz vs. Zepp, or Hartley vs. Colpitts . . ." and so on into the night.

Seriously, I have sent in my dues, a week ago, spurred to action by a circular from a well-known radio correspondence school telling of the fellow who put off sending in the coupon in the lower right corner and failed, while "our student is now earning \$500 a month."

While I am at it I think I will add a few thoughts that I have in mind regarding the League. In the first place I have been wondering if there are any others who have been in the League since Wm. B. Duck's catalogue was the standard reference, and, at the same time, have never owned a transmitter! This will be looked upon with disgust, I know, by all brass and "carbon" pounders, but I still wonder if this distinction, if you would call it such, carries with it the flavor of being an outsider, an onlooker, in the affairs of amateur radio. As far as animosity toward the other class of ham—the majority, no doubt, and rightly so—I haven't the least. In fact my interest is such that the Communications Department is read as avidly as any other part of our publication. But the question is, impersonally: Is a ham not a ham if he hasn't a transmitter? Does five, ten or fifteen years of experience and study of the receiving end of short, very short and ultra-short waves count for naught, even granted that it leaves something to be desired?

With a silent murmur of thanks to the Fate that directed my first copy of *QST* into my hands, I will sit back and enjoy my "perfect" ham receiver till that faithful complacency destroyer comes along again—next month's *QST*.

—Edmund Daly

QRP

R. F. D. No. 2, Medford, Oregon

Editor, *QST*:

For eight years I have been reading *QST* and now I find that I should like to make a suggestion. I noticed in a recent *QST* the remark that we could well do with a bit wider frequency allocation. Since it is doubtful if we are ever so fortunate as to receive any detailed frequency allocations, I think it is high time we do something to make those we now use a little more tenable.

There is a radio law, the meaning of which I find concisely stated in an old *QST*: "The minimum power required to insure satisfactory communication should be used at all times." Now, I ask you, how many amateurs have incorporated in their transmitters any means of adjusting their power to the requirements of the communication

UV227 . . .
UX245 . . .
UX280 . . .
UX226 . . .

230 — Gen
231 — Amp
232 — 2 vo
233 — Pow

UX250's —
UV211 — 7
UV845 — A
281M — M

Meters —
diameter —
Milliamm
0-30, C
0-300,
A.C. Volt
D.C. Volt
100 Watt
Bleeder
Resistanc
9 1/4" long
500,000 oh
Closing out
Latest Ama
Plot plug-4
Air King sh
50 watt soc
1/16" alum
Stand-off in
85 watt gri
Enameled a
20 ohm Ku
Special 100
20,000, 50,0
Plot Midge
Copper coil
5" dials for
J1, 25, 5,
GE 1/4 or 1
800v used
CT resistor
85 millihenry
Electric sof
9 plate mid
Acme 30 K
High frequ
7 x 18 solid
Microphone
WE VT tub
Solid No. 1
1000 volt o
own cond
3 mid, \$5.
All condens

WE SPEC
TERMS:

UN
123



[866 MERCURY VAPOR RECTIFIER \$2.95]

RCA LICENSED TUBES

UV227.....\$.35	247 — Pentode.....\$.75	UX171A.....\$.45	UY224.....\$.55
UX245.....\$.55	222 — Screen Grid.....\$ 1.00	UX201A.....\$.45	551.....\$.75
UX280.....\$.65	25v Pilot Lamp.....\$.10	UX112A.....\$.65	UY235.....\$.75
UX226.....\$.65	6v Pilot Lamp.....\$.10	UX200A.....\$.65	UX199.....\$.65

NEW 2V TUBES

210 — General Purpose.....\$.75
231 — Amplifier.....\$.75
232 — 2 volt Screen Grid.....\$.75
233 — Power Pentode.....\$ 1.00

NEW 6V AUTO TUBES

236 — Screen Grid.....\$ 1.00
237 — General Purpose.....\$.75
238 — Pentode.....\$ 1.00

TRANSMITTING TUBES—UX210's—15 watt rating—\$1.50

UX250's — 100% Modulator.....\$ 1.50	UX281 — 110 milliamper Rectifier.....\$ 1.50
UV211 — 75 watt General Purpose.....\$ 1.60	UV203A — 50 watt, Oscillator.....\$ 1.60
UV845 — Modulator.....\$ 1.70	872 — Power Mercury Vapor.....\$ 12.00
281M — Mercury Vapor Rectifier.....\$ 3.25	280M — Full Wave Mercury Vapor.....\$ 2.00

All tubes unconditionally guaranteed ninety days against mechanical and electrical defects

Meters — Black flange, Flush Panel Mounting, 2 3/4" diameter. Accuracy guaranteed.

Milliammeters, 0-10, 0-15, 0-25, 0-30, 0-50, 0-75, 0-100, 0-200, 0-300, 0-400, each.....\$1.00

A.C. Voltmeters, 0-3, 0-5, 0-7 1/2, 0-10, 0-15, ea. \$2.50

D.C. Voltmeters, 0-300, 0-600, \$3.00, 0-750, \$5.00

100 Watt } 5,000, 10,000, 20,000 ohm.....\$1.40

Bleeder } 50,000 or 100,000 ohm.....\$2.00

Resistances } 75,000 ohm with six taps.....\$2.20

9 1/4" long } 100,000 ohm with six taps.....\$2.30

500,000 ohm Frost Gain Controls.....\$.60

Closing out stock of Navy 5 watters, type CG1162, each.....\$.25

Latest Amateur Call Books.....\$.82

Plot plug-in coil forms. Complete.....\$.39

Air King short wave Coils. 15 to 210 meters. Set of four.....\$1.75

50 watt sockets, porcelain base, nickel shell.....\$1.50

1/16" aluminum for panels 6/10c per square inch.

Stand-off insulators, similar to GR \$.09 ea. Doz.....\$.90

15 watt grid leaks, 10,000, 15,000 ohms. Each.....\$.65

Enameled aerial wire No. 12 — any length. Per foot.....\$.4c

20 ohm Kurz Kasch rheostats with knob. Each.....\$.20

Special 1000v Dubilier mica condensers .002.....\$.25

20,000, 50,000, 100,000, 250,000 ohm potentiometers.....\$.50

Pilot Midget Condensers J5, J7, J13, \$.50, J23, .0001.....\$.55

Copper coil 3" diameter 1/4" tubing, per turn.....\$.00 1/2

5" dials for transmitter. Each.....\$.20

.01, .25, .5, 400v bypass condensers.....\$.25

GE 1/2 or 1 watt G10 neon lamps.....\$.55

800v fixed mica condensers. All capacities.....\$.15

CT resistors 10, 25, 50, 75 ohm.....\$.15

85 millhenry RF chokes.....\$.15

Electric soldering irons.....\$1.00

9 plate midget condensers (18 mmfd Max. Capacity).....\$.35

Acme 30 Kc intermediate transformers.....\$1.20

High frequency buzzers.....\$.75

7 x 18 solid walnut cabinets.....\$1.00

Microphone springs. Set of eight.....\$.20

WE VT tubes, 5 watters, each.....\$.75

Solid No. 18 pushback hook-up wire. 25' roll.....\$.20

1000 volt oil impregnated condensers, uncased. Make up your own condenser units. 1/2 mfd, \$.20; 1 mfd, \$.30; 2 mfd, \$.40; 3 mfd, \$.50; 4 mfd, \$.60.

All condensers guaranteed as rated.

RADIOBUILDERS PRODUCTS

TRANSMITTING FILTER CONDENSERS

Mfd.	800v.	1000v.	1500v.	2000v.	3000v.
1	\$1.10	\$2.00	\$2.95	\$4.75	\$6.95
2	1.55	3.00	3.95	8.00	12.50
4	2.75	4.00	5.50	14.00	19.95

Above condensers tested at 40% overload. All sealed in heavy metal containers with crystalline finish; large terminal insulators. Above ratings are actual DC working voltages. All are guaranteed.

POWER CHOKES

Henries	Mils	Weight	Size	Price
30	100	7 lbs.	4" x 5" x 6"	\$2.50
30	250	12 lbs.	3 1/2" x 6" x 7"	3.50
30	400	20 lbs.	3 1/2" x 7" x 9"	4.50
15	400	15 lbs.	3 1/2" x 6" x 7"	3.95
60	125	12 lbs.	5 1/2" x 6" x 7"	3.50

POWER FILAMENT TRANSFORMERS

Voltage	Amperes	Weight	Price
7.6 CT	1.75	1 1/4 lbs.	Unmounted \$1.00
7.6 CT	1.75	2 1/4 lbs.	Fully Cased 1.45
2.6 CT	10	4 lbs.	For 2-866's — Uncased 2.75
2.6 CT	10	5 1/4 lbs.	For 2-866's — Cased 3.50
All 866 transformers have 18,000 volt insulation breakdown.			
11 CT	10	12 lbs.	For 3-50 watters — Cased 5.50
12.5 CT	10	13 lbs.	For 2-250 watters — Cased 6.00

All cased transformers fully mounted and shielded in metal containers black crystalline finish; large terminal insulators.

5 METER RECEIVER

Completely wired and tested super regeneration receiver — extra sensitive. Built on aluminum chassis. Aluminum panel with full vision dial.....\$18.50
Available in kit form.....\$13.50
5 meter push-pull 112 — 245 or 210 transmitter — wired and tested.....\$9.45
Available in kit form.....\$5.45
UX210 tubes that oscillate on 5 meters.....\$1.75
Write for details on above.

NEW AMATEUR PHONE BAND CRYSTALS

3900-4000 KC pure Brazilian Quartz "X" cut 1" square crystals. Be prepared for April 1st. Each.....\$4.40
Radiobuilders plug-in crystal holders, each.....\$1.50
Crystals anywhere in 80 meter band, each.....\$4.40
Calibration accuracy guaranteed 1/10 of 1%.

WE SPECIALIZE IN OBTAINING COMPLETE KITS, ETC. — ALL MERCHANDISE GUARANTEED

TERMS: CASH OR C.O.D.

ALL PRICES F.O.B. NEWARK, N. J.

UNITED RADIOBUILDERS

1234-36 • SPRINGFIELD AVE.
• IRVINGTON, NEW JERSEY •

Say You Saw It in QST — It Identifies You and Helps QST

OF
QST

Future issues of **QST**, too, will be of greater value to you if you have these copies for their back-issue references.

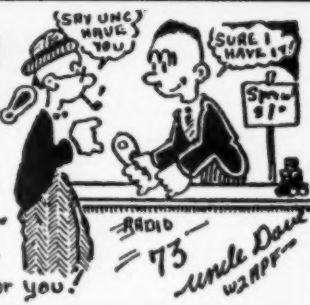
If we would all put a primary rheostat on that plate transformer or arrange some way to switch the taps on the secondary side, we sure could cut down a lot of the hash that makes it so unpleasant to operate during the evening hours. Incidentally, on a transmitter of even moderate size, it should make quite a difference in the power bill.

— H. D. DeVoe, W7MF

Say You Saw It in QST — It Identifies You and Helps QST

UNCLE DAVE

356 Broadway Albany New York
 We buy, sell and trade Ham stuff!
 24 HOUR SERVICE SHIP ANY PLACE
 If we have not got it we will get it for you!



W.E. 211E Slightly used 50 watters, guaranteed... \$3.89

LOOK AT OUR SPECIALS THIS MONTH

Thermostats for temperature control ovens.....	\$.98	Power transformer, Arco, with voltages: 575 each side of C.T. 2-7 1/2 v. C.T. filament winding, 1-2 1/2 v. 12 amp. C.T. winding, special.....	\$5.00
G.E. 0-500 D.C. milliammeter, NEW, each.....	3.89	Power transformer, Arco, with voltages: 350 each side of C.T., 2 1/2 v. 12 amp. fil. winding, 5 volt. C.T. fil. wind. spec.....	3.75
Roller-Smith Hot-wire 0-4 and 0-6 amp. Radiation meter.....	2.89	Filament transformers, Arco, with following voltages: 2.5 volt, 20 amp.....	\$3.74
International Midget Radio-Set in cabinet, 4 tube, all wave, set tunes 75-550 meters Pentode, multi-tube, complete with Cunningham tubes.....	15.95	2.5 volt, 10 amp.....	2.25
1000 mfd. 1000 volt Variable Condensers.....	1.65	5 volt, 10 amp.....	3.25
Used Radio Institute Course.....	9.95	7.5 volt, 7 amp.....	2.50
Gen. Pyrex 7 1/2" insulation 70c, 12".....	2.00	10 volt, 6.5 amp.....	3.75
Sprague 12 mfd. electrolytic condensers.....	1.29	New DeForest 222 tubes.....	.90
W.E. tinned push back wire, per 100 feet.....	.50	Relays, Arco unmounted, 1000 uses, will follow 40 WPM, double one-eighth inch contacts.....	1.39
New Utah & Muter 110 volt D.C. Dynamic Speakers.....	3.95	Complete Presto semi-comm. home recorder, in portable case. Cutting-head, microphone, pick-up adaptors, 227 tube, motor, list \$150, net.....	40.00
Sl. used Dongan 300 watt power transformers, 1000 v. each side C.T. 1-, 1-, 1-1/2 fil. winding.....	5.95	New Samson Pam 19-20 Amplifiers.....	46.50
Zenith 30-Henry 80 mill. choke.....	.89	New Samson Pam 16-17 Amplifiers.....	35.00
Crosley 30-henry double choke 125 mills.....	1.65	LATEST MODELS, UNIVERSAL MICROPHONES	
5000 ohm, var. resistors, 29c — Coil shields.....	.17	Model X — \$3.65; Model BB — \$14.00; Model KK — \$28.00; Model LL.....	\$37.50
Sl. used Weston Thermo milliammeter 0-125 mills.....	6.30	Heavy duty MV, 866 tubes, guar. 1st quality.....	2.50
Ellis \$25.00 used Double button microphones.....	8.00	Extra heavy duty MV, 866 tubes, our own Arco Brand, 1,000 hrs. unconditionally guaranteed.....	3.35
Western Elec. al. used double button mikes.....	20.00	Weston pattern 301, 0-50 milliammeters.....	4.00
W.E. new 600A microphones \$35.00 — Silver Marshall or Pilot coil forms.....	.39	ARBORPHONE AC Amplifier, 2 units, including power pack, uses one 227 ahead of two 171As, push-pull, beautiful job. Ideal for speech amplifier. Per pair.....	5.00
Signal Corps VT2, \$1.75 — Pushpull input & output trans. pr.....	1.75	RECTOBULBS — new type R3.....	\$6.95
Jewell 0-100 volts DC meter \$4.00 — Weston 0-150 v. AC.....	5.00	New Ninth Edition Amateur Handbook.....	1.00
Microphone springs \$ for 20c. Duraluminum .002" sheets, 6" sq. 80c (for mikes).....	34.00	Teleplex with 3 rolls of tape.....	13.00
Eaco 24 v. D.C. to 800 v. D.C. motor generators new list \$175.00, spec.....	19.50	General Electric Complete Phonograph turntable.....	7.50
15-dial Omnigraphs \$15.00 — Sl. used Universal KK microphones.....	1.35	National coils for SW-3 or 5 up to 2000 meters.....	Special
30-henry 150 mill. Victor chokes.....	3.00	UX or UV isolantite low loss socket, each.....	\$.20
Arco mike transformers.....	32.50	RCA lic. tubes, UV 227, 226, 224, 245, 201A, 247, 235, 280, also Spanton tubes.....	.39
New Universal Super Wasp 6-tube AC, in cabinet.....	13.35	No. 12 enam. aerial wire, 100 ft., \$65, 200 ft. roll.....	1.25
Arco Temperature Control Ovens comp. with crystal ground to frequency, and holder.....	17.50	Stromberg-Carlson 2 Henry 300 mill. key click chokes.....	1.25
Aluminum and Bakelite panels cut to order, double-corner slot aluminum, 15c ft.....	1.95	ARSCO TRANSMITTING CONDENSERS	
Bakelite tubing, magnet wire, nuts, bolts, screws, and other junk. We need the business. Yours truly, Uncle Dave.....	2.95	1 YEAR UNCONDITIONALLY GUARANTEED	
Arco 75 watt sockets.....	1.00	1,500 volt.....	3,500 volt
Jewell Pat. 135 0-5 volts d.c.....	.75	1 mfd. \$1.95 1 mfd. \$4.50 1 mfd. \$8.50 1 mfd. \$9.50	1 mfd. \$5.00
Standoff insulators, \$1.00 each, per doz.....	1.35	2 mfd. 3.50 2 mfd. 6.50 2 mfd. 12.50 2 mfd. 14.00	2 mfd. 2.70
Used Wheatstone bridges.....	1.45	4 mfd. 5.25 4 mfd. 12.50 4 mfd. 22.00 4 mfd. 26.00	4 mfd. 1.00
Marco illuminated dials or Marco plain ver.....	5.80	Very sturdily built, finest material. All cont. working d.c. voltage.	
Pyrex lead-in bowls.....	1.15	300 volt.....	1,000 volt
Jewell 10-25-50-100-200-300-500 milliammeters.....	1.50	1 mfd. \$.20 1 mfd. \$.30 1 mfd. \$.50	1 mfd. \$.70
Weston 10-25-50-100-200-300-500 milliammeters.....	1.15	2 mfd. .25 2 mfd. .40 2 mfd. .50	2 mfd. .70
NEW PHONE BAND CRYSTALS!		3.5 mfd. .35 3.5 mfd. .50 3.5 mfd. 1.00	3.5 mfd. 1.50
Crystals ground to any frequency you specify also the new 3900-4000kc. fone band. Complete with moulded bakelite, dustproof, adjustable holder — extra special.....		4 mfd. .40 4 mfd. .60 4 mfd. 1.50	4 mfd. 1.50
Your present phone crystals exchanged for new bands.....		The new National SW3 d.c. or a.c. National power pack and all other National products in stock. Write for lowest prices in the country	
Your pet crystal ground to any higher frequency.....		Mercury Vapor 280M tubes.....	
Arco finished and oscillating crystal blanks, guar.....		G.E. 5 watt 1162 Navy tubes, three for.....	
Arco unfinished blanks, guaranteed.....		W.E. 211D guar. oscillator, used, \$10. New.....	
Arco bakelite, dustproof, adjustable, crystal holder.....		W.E. 212D guaranteed, used, \$35. New.....	
Arco same as above, but plug-in crystal holder.....		Slightly used 860.....	
Arco comm. precision, plug-in crystal holder, beautiful job (G.R. plugs and jacks).....		Monitor cans 5x6x7 cover drilled, ready to go.....	
		Radio Amateur Callbooks.....	
		Arco 10,000 ohm. 100 watt trans. grid leaks.....	
		Arco 12,500 ohm. 100 watt trans. grid leaks.....	
		Ward-Leonard 25,000 ohm trans. grid leaks, 100 watt.....	
		UX 222, UX210, UX250, special guarantee.....	

OPEN EVENINGS

WE CARRY EVERYTHING FOR THE HAM IN STOCK

Write for Free Ham Sheet

UNCLE DAVE'S RADIO SHACK

Long Distance Phone 4-5746

356 Broadway

Write for FREE HAM Sheet

MORE FOREIGN TRADE SOLICITED

ALBANY, NEW YORK

Say You Saw It in QST — It Identifies You and Helps QST

73



High "Signal to Noise" RATIO in this SW-3 Receiver



THE NATIONAL SW-3 RECEIVER is designed exclusively for amateur and experimental use—head-set reception only.

For A.C. or D.C.

The SW-3 operates on full A.C. (with special NATIONAL 5880 power supply), on A.C. for filament supply with B batteries, or entirely on batteries using the new 6 volt heater tubes. It is thus suitable for every operating condition. Specify whether A.C. or D.C. model is wanted.

Single Audio Stage

Serves as essential coupling between detector and head phones, insuring smoother sensitivity control, freedom from fringe howl and back-lash and elimination of feedback.

Calibrated Attenuation Control

The audio stage also makes possible an exclusive feature of the SW-3 in which the volume control also serves as an audibility meter. On the SW-3 the "R-rating" of signal can be read at sight from the position of the volume control. This is mounted so that it can be operated with the same hand as the tuning dial.

Single Control

The SW-3 has real single control. Trimmer is set only once to supply proper "padding" for transformer and antenna.

Band Spread Coils

Wound on R-39, low-loss dielectric material, specially developed by Radio Frequency Laboratories for National Company, are standard equipment, for 14, 7, and 3.5 mc. amateur bands.

Sensitivity Varies on Inverse Exponential Curve

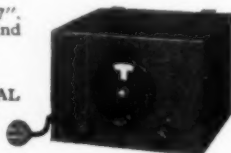
When using the '35 variable-mu tube, sensitivity varies on inverse exponential curve so that extreme sensitivity is possible without critical setting of controls.

Compact—Portable

Dimensions are 9" x 9 3/4" x 7". Especially suitable for aircraft and expedition work.

Price Is Right

The price of the NATIONAL SW-3 puts it in the easy reach of every amateur. Write us for particulars and prices using coupon below.



NATIONAL SW-3 AMATEUR RECEIVER

National Company, Inc.
61 Sherman Street
Malden, Mass.

Gentlemen:

Please send me full particulars and prices on your new SW-3 Ham Receiver.

Name

Address

QST-4-32

w9bpq w9bpt w9bqc w9brx w9bty w9buy w9bwc w9bwy
w9cah w9cbs w9cec w9ced w9cee w9che w9cjj w9cju w9eld
w9eml w9ems w9ene w9ecou w9eah w9esp w9ewa w9ej
w9esm w9daq w9dex w9dgb w9dgg w9djb w9djh w9dki
w9dkm w9dmg w9dmx w9dod w9dpg w9dqc w9dqs w9dra
w9dtl w9dur w9dwl w9dsm w9dsp w9eat w9eca w9eco
w9edl w9edw w9eid w9ejv w9emf w9eco w9eod w9eel
w9etd w9eth w9eto w9etq w9eua w9ewd w9eyw w9fax
w9fbu w9fel w9fdm w9fei w9ffa w9fbc w9fke w9fliq w9fne
w9fnt w9fqu w9fuj w9fxt w9fal w9gah w9gay w9geq w9get
w9gig w9gig w9ggu w9ghx w9gii w9gku w9gly w9goe w9gtt
w9guk w9gwj w9gxi w9gxk w9gyk w9had w9hbg w9hbb
w9heo w9hdo w9hgs w9hia w9hij w9hkg w9hku w9hmr
w9kp w9mq w9os w9qx w9vh w9ya w9yh

(1750-ke. 'phone band)

w1aje w1ber w2fr w2gl w3rp w4alo w4avj w4axi w4lc w5abt
w5ajo w5aki w5alj w5anb w5awp w5bas w5bqx w5bvs
w5gg w5pp w5av w5as w5sz w5ao w5ahw w5awq w5caw
w5cmf w5cpj w5cwr w5ddu w5dec w5edy w5egu w5eyv w5io
w5agx w5akg w5bbs w5bei w5bfs w5bjc w5bjm w5bop
w5ecg w5edm w5ehf w5ekj w5ekw w5emp w5evk w5end
w5das w5dax w5dbr w5doo w5dev w5dgy w5dky w5dmw
w5dpg w5dgg w5dgm w5dqw w5drn w5dwh w5dof w5dee
w5een w5ejx w5ehd w5eim w5ekl w5em w5epw w5eal w5iad
w5fbl w5fdb w5fdm w5fgi w5fha w5fld w5flm w5fls w5fms
w5fne w5fxv w5gbs w5gda w5gtt w5hbb w5hbp w5hbl
w5hhv w5hkg w5ik w5ti

W3ABA, Harry E. Eaton, Adamstown, Md.

(7- and 14-mc. bands)

em2cf em2es em2jm em2lc em2mm em2op em2rs em2rv
em2vm em2wd em2fe em2ah em2as em2yb em2ibx em2lu
em2et, ear96 ear136 f8pa f8ps g2vq g5by g6wy gx2tn haf4e
he1ea hh7c hi8x hk1da hk3rg k4aan k4acf k4aop k4es k4rj
k4rk k4ry k4ug k5aa k5ab k5ac k6al k6boe k6cqs k6dmm
kalhr k4thw kdv5 kfst kgeg lals ldsd lu5ar ma7k nede
nylaa om1tb on4jp pa0me pa0ld pylff sm7rv ti2fg ti2hv
vk2ok vk3bq vk3fk vk3ml vk3nm vk3sx vk6ow vk6rx
vk6wr v1ba v1yb vo8wg vo8z vp2cc x5c x7c x9a z55u

W5VV, Wilmer Allison, 1502 West Ave., Austin,
Texas

(7000-ke. band)

em2aa em2au em2gu em2jm em2na em2op em2ra em2sf
em2sv em2vm em2wa em2fe em2as ear96 ear224 fa5 hb7e
hlak jher jkg k4acf k4ak k4aop k5es k4ko k4ph k4rj k4rk
k4ry k4ug k5aa k5ab k5ac k6ar k6au k6boe k6dv k6dva
k6fex k6ir k6ow k6vg k7atd kalhr kaljm kaljr lu5ar om1f
om1tb on2tr pk1ab px2 ti2fg velbw ve2bl ve2bv ve2nd
ve2eq ve2dr ve3bo ve3cf ve3ib ve3ij ve3ja ve3kj ve3mr
ve3ra ve4ci ve4op ve4gt ve4gy ve4im ve4ia ve4jb ve4ac
ve5eh vk2ax vk2bo vk2bq vk2br vk2bu vk2dr vk2fz vk2hg
vk2hq vk2ha vk2jo vk2nr vk2os vk2rs vk2tz vk2xu vk3aj
vk3bw vk3cw vk3fm vk3fy vk3gj vk3jt vk3ju vk3jw vk3lq
vk3rg vk3rj vk3xi vk3za vk3da vk5gg vk5hk vk5mx vk5kp
vk6gr vk6fl vk6ri vk6wi vk7ge x1aa x1l x1m x1n x5c x1lar
xl1gq xl2aj xl2ei xl2di xl2du xl2fr xl2gw xl2jx xl3aj xl3aw
xl3cc xl3es xl3et xl3dn xl4by

G6YL, Miss B. Dunn, Felton, Northumberland,
England

(7000-ke. band)

w1ch w8dv w9ers ct2af ct2an cm8md frear149 fm8er fm8da
fm8eg fm8ev fm8gt fm8ih cv5av cv5mg pylff st2d suleh
au7kao au8kal v7gt y2dc z52a z1ra x1pg x1lyj xan2a

(14000-ke. band)

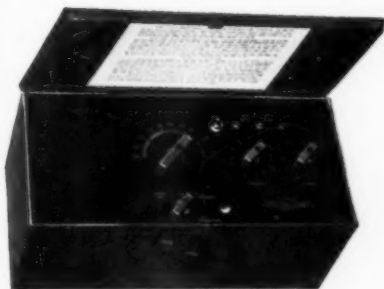
w1ae w1afa w1avj w1beo w1ou w1eun w1lh w1ew w1wv
w2ad w2arb w2ary w2ber w2bbs w2dha w2mb w3ajd w3bbs
w3bpm w3cdk w3cep w3cm w3ekt w3nu w3ek w4awo w4ja
w4mr w8afp w8auw w8bip w8bva w8cew w8ckp w8ers
w8dhe w8uc w9asq w9bqh w9ces w9dlld w9gfa velbl velbt
velld veldm veldq veldr ve2aa ve2df vk2ls vk2xu vo8me
vq2lc yi2de zu6w fm8er fm8da fm8eg fm8gk fm8ih cm8mi
un7pp xoh5oa xlals x8jse tun5 x1lyj xan2a

VK7CH, C. Harrison, Rokey Rd., Bellerive,
Tasmania

ao8al ao8na au1de au3ea au7kah au8kal ct1aa ct1gu cv5as
cv5av d4adc d4bum d4cul d4lrm d4rnr d4uan d4uao d4uwm

Outstanding Instrument Values

For the Serviceman »»



Jewell Pattern 563 Oscillator

1. Output adjustable to any frequency in the three bands by means of fundamental waves: broadcast 550-1,500 K. C.; low intermediate 125-175 K. C.; and high intermediate 160-280 K. C.
2. Calibration curve for each range carried in the cover.
3. Entire instrument, including self-contained batteries, is shielded by the metal case.
4. Separate output provided for neutralizing adjustments.
5. Priced remarkably low for a Jewell quality instrument.



Jewell Pattern 444 Set Analyzer

Makes every necessary test on all modern radio receivers — tuned radio frequency and superheterodyne. Direct tests are provided for variable- μ , output pentode, and r. f. pentode circuits. Output measuring and resistance-continuity ranges are provided.

Many unusual features are embodied that give greatly increased durability — non-shatterable meter glasses, panel and over fifty other parts of molded bakelite, test cord and plug detachable at analyzer panel, and others. Write for complete description of this remarkable instrument.

For the Amateur »»



When you rebuild your transmitter this spring — make sure that you will get the utmost performance from every unit. Put the famous Jewell "Transmitting Trio" in your critical power circuits. Better performance and protection against dangerous overloads will more than repay their cost.

32 YEARS MAKING INSTRUMENTS
JEWELL

A
Transmitting
Meter for
Every Need

Jewell Electrical Instrument Company,
4 Haynes Avenue, Newark, N. J.

Please send me the following literature:

☐ Jewell Transmitting Instruments ☐ Jewell Service Instruments

Name Address

City State

Say You Saw It in QST — It Identifies You and Helps QST

Jewell Radio Company

**POWER AMPLIFIERS
PACKS
SUPPLIES A SPECIALTY**

Exclusive Eastern Distributors for

PURADYNE PRODUCTS

Reg. U. S. Pat. Office

The PURADYNE Plate supply transformers have been designed so that they may be adapted to the most common applications in rectifying and transmitting circuits. The primary windings are designed for operation from a 60 cycle 110-115-volt supply. All units are designed for continuous operation at full load. The insulation test at a potential of 10,000 volts insures satisfactory operation under all possible conditions.

No.	Out Put Voltage	Filament Voltages	Watts	Price
80	2500-0-2500			\$11.95
	1500-0-1500			
50	1500-0-1500		500	8.50
	1000-0-1000			
10	750-0-750	7 1/2 V. c.t.-7 1/2 V. c.t.	325	5.00
10A	600-0-600	7 1/2 V. c.t.-7 1/2 V. c.t.	200	4.00
45	375-0-375	2 1/2 V. c.t.-2 1/2 V. c.t.	100	3.50

Heavy Duty Shielded with stand-off insulators
No. 80 \$13.50 No. 10 \$6.00
No. 50 10.00 No. 10A 5.00

PURADYNE filament transformers, 10,000V. insulation in metal cases with stand-off insulators: All guaranteed for one year against any defects.

ALL CENTER TAPPED:

2 1/2 V. — 12 amps for 860s.	\$3.50
2 1/2 V. c.t. 10 amps each winding for 860s.	4.50
5V. — 20 amps for 872s.	6.00
7 1/2 V. — 7 amps, for 210s, 250s, 281s.	3.50
2-7 1/2 V. c.t. at 6 amps, each.	4.50
3-7 1/2 V. c.t. at 6 amps, each.	6.50
10V. — 7 1/2 amps for 204As, 211s, 852s, 860s, 845s.	4.00
12V. — 10 amps for 204As, 212Ds.	4.50
14V. — 12 amps.	5.00

Special filament transformers with stand-off insulators tapped at 20V. — 18-14-12-10-7 1/2-2 1/2 Volts. \$12.50

PURADYNE microphone transformers in neat shielded cases, single button \$1.75 — double button \$3.50. Mike stands, table model \$2.00, floor model adjustable to eighty inches, staturary bronze or silver finish. \$4.50

PURADYNE 30 Henry 125-mil choke 260 ohms d.c. resistance. \$1.00

PURADYNE 250 mil. choke 30 Henrys 110 ohms d.c. resistance in metal case with stand-off insulators. \$3.00

PURADYNE 30 Henry 250 mil. double chokes. \$5.00

PURADYNE 500 mil. choke 30 Henrys 110 ohms d.c. resistance in metal case with stand-off insulators. \$7.50

PURADYNE .001, .002, .006 plate-blocking condensers with stand-off insulators. \$.75

PURADYNE guaranteed transmitting filter condensers, metal cased with stand-off insulators. All condensers rated at a continuous working Voltage.

Capacity	1000 Volts	1500 Volts	2000 Volts	3000 Volts
1 mfd.	\$1.25	\$2.00	\$3.00	\$ 6.00
2 mfd.	2.00	3.00	5.00	12.00
3 mfd.	2.50	3.50	6.50	28.00
4 mfd.	3.25	5.50	9.00	36.00

PURADYNE 200-watt center tapped transmitting grid-leaks in metal case with stand-off insulators:

5,000 Ohms.	\$1.75	20,000 Ohms.	\$2.50
10,000 Ohms.	2.00	30,000 Ohms.	2.75
15,000 Ohms.	2.25	50,000 Ohms.	3.75

NOTE: JEWELL carries the most complete line of power amplifiers and PA Systems in the city. Send for literature.

PURADYNE heavy duty 50 watt sockets, porcelain base, metal shell, double contacts. Very special. \$1.00

PURADYNE 281 Mercury Vapor Rectifying Tubes. 4.00

PURADYNE Mercury Vapor AAA heavy duty 866 Rectifying Tubes. 4.50

Special Class B Modulation Transformers, a pair. 5.50

PURADYNE COPPER COILS. Prices per turn

Inside Dia.	3/16"	1/4"	5/16"
2 1/4"	8c	9c	14c
3 1/4"	9c	11c	16c
4 1/4"	7c	8c	

Fibre Tubing 1/2-inch and 1-inch, per inch. \$.03

LAST MINUTE SPECIALS!

THORDARSON Fil. Transformer 1 1/2 V. 2 1/2 V. 5V. \$1.25

R.C.A. 2 Henry 300 mils, 20-ohm key click and filter chokes. 1.25

Single button receiving and transmitting microphones 3.50

Enameled aerial wire No. 10, 100 feet solid. .90

W.E. Shielded three wire microphone cable, per foot. .06

MERSHON electrolytic Condensers, metal cases, 8 Mfd. 450V. .45

Voltage Dividers, 18,000 Ohms for 245 P.P. 5 taps. .35

EVEREADY RATHENON Photo Electric cells. List \$35.00. 0.50

We Can Supply Anything — At Jewell's Prices — Ask For It

Compare the Prices

Include postage with all orders and 20% deposit against C.O.D. Shipments

Jewell Radio Company

58 Vesey St.,—110 Chambers St., N. Y. City

Phone Barclay 7-5907

Dept. S

d4xdb ear37 ear94 ear126 ear185 enri earoo earva earz
e2kco eo6bh eu6xt f8owl f8dp f8ny f8ol f8mp f8pa f8rj
f8ex f8as f8ub f8vp fm4ab fm8db g2dn g2dz g2ig g2sq
g5fv g5gq g5la g5pj g6gl g6ig g6li g6nf g6rb g6wy g6xn
g15ay haf2e haf3ap haf3ex haf9ad haf9af haf9p hb9h hb9j
hb9q hb9s hb9u hb9v hb9y hel1g ilau ilie ilraw i2na ilee
j3dh k4aef k4es ok1aa ok1kd ok1pk ok2ag ok2ce ok2op
ok2si ok2za om1fo om2tg on4au on4fb on4he on4sd pa0as
pa0dw pa0qf pa0pq pk1ab pk1ac pk3bw vk3ce vk3em vk3ek
sp1bq sp1bt sp2dr sm7rv st2d sulch un7pp uo3wb vp1aj
vp1ff vp1fr vslad valfd va3ac va7ai va7gp va7gt vu2jp
xlax yhlrv xtdx kgeg cskw wlv kdv5 ex7e xau7ej spl287
xf8ufm xf8nih

W9EMY, Carl P. Kirkeby, Upham, N. D.

(7000-ke. band)

em2kw em2lc em2vm em3na em8az hil1b k4kc k4rj k4rk
k5an k5ab k5ac k5ws k6aja k6dv k6ef k6ir lu5ar ti3la
vk2je vk2px vk2ps vk2xg vk2xu vk3bw vk3ce vk3em vk3ek
vk3jl vk3lq vk3la vk3nm vk3oc vk3pp vk5mf x1u x26a x1lar
x1lbn x1lek x1lfu x1lgc x1lmk x1lar x1lba x1lei x1lew x1lfa
x1lfr x1lgr x1lwg x1law x1lax x1lbn x1lce x1lcl x1lex x1lbn
x1lai x1lao x1lam x1lap x1lba

W9FLI, Wagner, S. D.

(7000-ke. band)

k5an k5ab fa5 em2jt em2op em2ra em8az em8by ve4dj
ve4iu ve4ev ve4ff w1mk w2amr w3nt w4aei w4fan w4ue
w4wno w4rv w4bat w4oi w4agf w4fx w4ux w4akh w4ako
w4si w4ql w5bee w5bdd w5aqg w5db w5byq w5atf w5bpn
w5vrv w5wv w5ot w5ayl w5any 25agq w5bus w5et w5bao
w5adj w5aoz w5bee w5ds w5aue w5bez w5brw w5atf w5bmi
w5oh w5rb w5bkb w5bev w5env w5cau w5cah w5buo w5ecr
w5axm w5bja w5bde w5bdw w5bae w5baf w5bfz w5fcl
w5dje w5aim w5aao w5aiu w5bff w5dfo w5ecp w5fge w5dow
w5edd w5efe w5cm w5adk w5ez w5dep w5omu w5dne w5eqy
w5cae w5der w5baf w5avz w5bcw w5bwn w5bra w5bfm w5dn
w5blz w5ti w5bdt w5eqf w5faa w5cft w5bun w5dpl w5ll
w5fex w5aoz w5bjx

VE2DS, H. S. Gowan, 819 Godin Ave., Verdun de
Montreal, Que.

(1750-ke. band and c.w.)

w1afq w1ane w1apj w1apk w1azn w1bad w1chw w1cjs
w1coi w1cpl w1cpm w1mk w1bnd w2bdr w2bfl w2bnj
w2cfw w2cgd w2gij w2zn w3cai w3ap w3rp w3ub w5bm
w5ei w5aje w5agv w5bav w5bdg w5bjl w5cjb w5cmf w5ope
w5cas w5dwy w5eka w5ep w5fpn w5pu w5ana w5bpg
w5ehw w5fal w5fjw w5kx w5vl

(1750-ke. 'phone band)

w1apk w1aqp w1ber w1bad w1ojr w1dbm w1io w2ahp
w2gl w3ac w3btg w3cke w3caw w3emp w3gtt w3elc

W6EDW, Lewis C. Heinzman, 659 W. Third St.,
San Pedro, Calif.

w1avv w2ais w2anb w2bst w2euj w2dm w2sn w2wh w4abt
w4agb w4akh w4aad w4bnd w4dw w4ll w4nn w4oi w4rv
w4ue w4zh w4zv w5abo w5adb w5afv w5ahr w5ai w5ama
w5and w5ann w5aqy w5auy w5avv w5ayl w5aze w5avv
w5bdd w5bdr w5bee w5bez w5bfp w5bfz w5bhq w5bjt
w5bhn w5bot w5bqa w5bri w5bus w5bvf w5bwj w5bxc w5ca
w5cah w5cdc w5ce w5de w5epp w5fj w5ga w5gk w5go
w5it w5itk w5iv w5kw w5nv w5pm w5rv w5wf w5wv w5wy
w5zsz w8aou w8che w8fcq w8si w9aen w9aew w9afh w9alc
w9alz w9arl w9bbv w9bhn w9bat w9bpm w9bpy w9bvw
w9bvr w9egu w9emo w9eu w9dds w9dlm w9dma w9dsc
w9dve w9dwd w9dyp w9dzj w9ebe w9ebi w9ehx w9eig
w9ele w9elg w9els w9ema w9emy w9eut w9eyn w9ffd w9fik
w9fkp w9fml w9fnk w9fpi w9fqm w9frq w9fyk w9fak w9ga
w9gbj w9gbr w9geg w9geg w9gdh w9gkj w9gkt w9gnt
w9gos w9guu w9hgo w9hrx w9ij w9ijl w9ijo w9if w9ve
ce2ag cm2mg ilee jlet k4rk k5aa k6aiv k6alm k6anb k6ir
k6dv k7atf ve4ag ve4ie ve5eh ve5fg hel1g vk3xi x1lap

ZT1Q, Dr. J. Lunt, Kenilworth, Capetown, South
Africa

(14,000-ke. band)

ce3ca ct1aa, ct1af, ct1jw, ct2bm, ct2bt, ear96, ear136,
ear177, ear185, earne, f8ex, f8od, fm8is, fmih, g2bm,



SANGAMO MICA CONDENSERS

Are Accurate—Stay Accurate

Where accurate dependable condensers are required, specify Sangamo. These units are manufactured particularly to meet the demand for a quality condenser reasonably priced. Also available in 5000 volt rating in capacities from .00005 to .002 Mfds.

Write for booklet describing this
complete line of condensers

Sangamo Electric Co.

Springfield, Illinois

LOW RANGE FUSES

Littelfuses for Instruments: Amps.: 1/100, 1/32, 1/16 — 20c ea.
1/8, 1/4, 3/8, 1/2 — 15c ea. 1, 2 — 10c ea. For milliammeters,
ham rectifiers, etc. Use 1/8 for radio B circuits. *High Voltage*
Littelfuses: 1000, 5000, 10,000 volt ranges in 1/16, 1/8, 1/4, 3/8,
1/2, 3/4, 1, 1 1/2, 2 amps. Renewable. Price 35c to \$1.25 ea.
Write for instructive bulletin 4-A.

LITTELFUSE LABS. 1772 Wilson Ave., Chicago

LITTELFUSES

EVEREADY
Layerbilt
"B" BATTERIES

SPECIAL

866 Fil. Transformer **\$4.25**
2 Heavy Duty 866 Tubes
with Fil. Transformer **\$11.00**
2 Regular 866 Tubes with
Fil. Transformer **\$8.50**



**Rectifier
Charger
Bulbs**

.06 Amps. \$2.15
2. Amps. 2.15
5-6 Amps. 3.95
15. Amps. 6.85

DEALERS
Write for
Quantity
Discount

**NOW
READY!**

ODEON

**50
WATTERS**

**203A
211-845**

**\$14.⁰⁰
Each**

GUARANTEED

REDUCED

Odeon Lo-Ripple

866

NOW \$2.50

Heavy Duty

NOW \$4.00

NEW

ODEON 888



Fil. Volts 2.5
Fil. Amps. 2.0
inv. peak
Plate Volts 7500
Plate Amps. .3

\$2.00

No pre-heating necessary. Turn
on plate and filament at same
time.

20% With Order—Balance Shipped C. O. D.

Send Postage or Express Charges

Mail Orders to:

30 CLINTON STREET **ODEON MANUFACTURING CO.** NEWARK, N. J., U. S. A.

Quality +

AT BARGAIN PRICES

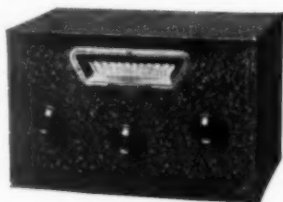
Royal SHORT WAVE RECEIVER

SPECIAL PRICE!

\$14.95

Set of Tubes \$2.20
Batteries \$5.45

Royal Model RP
List Price \$25



SCREEN GRID POWER PENTODE

A new super-sensitive short-wave receiver using a screen-grid 32 and a powerpentode 33 tube. Amazing volume on all stations. . . It is sturdily constructed on a heavy metal chassis and enclosed in a neat crackle finished cabinet. A high ratio, full vision dial makes tuning remarkably easy. "Ham" model has 20, 40 and 80 meter bands widely spread. The "Regular" model covers from 14 to 200 meters (550 meter coil 75c extra). State choice when ordering. (Also in kit form with complete instructions — \$10.95.)

Guaranteed to Give Better Results Than Others Selling for Higher Prices!

ROYAL HEAVY DUTY TRANSFORMERS

Powerful and sturdy! Carefully constructed of the highest grade materials. Heavy duty windings and large, over-size silicon steel core give excellent regulation. Completely mounted in neat cast aluminum cases with leads to terminal board. Guaranteed for one year against any defect. Expressly designed for transmitters and power amplifiers. Insulated for 10,000 volts. It pays to buy the best!

Type	Voltage	Watts	Lbs.	Price
A	2500-1500-0-1500-2500	850	30	\$11.95
B	2000-1500-0-1500-2000	850	28	11.45
C	1500-1000-0-1000-1500	375	19	8.45
D	750-0-750	250	14	4.95
F	750-0-750, 7 1/2 CT. & 7 1/2 CT.	450	18	6.95

The following are in neat brown crackle finished metal cases. Insulated for 1500 volts.

G	1500 CT, 7 1/2, 7 1/2 CT. & 2 1/2 CT.	275	14	4.25
H	1200 CT, 7 1/2, 7 1/2 CT. & 2 1/2 CT.	200	11	3.65
J	800 CT, 5, 2 1/2 CT. & 2 1/2 CT.	150	9	3.50
K	700 CT, 5, 2 1/2 CT. & 2 1/2 CT.	150	9	3.25
L	750 CT, 5, & 2 1/2 CT.	100	5	3.15

NOTE: The above prices are FOB Minneapolis, Minn.

ROYAL Porcelain Stand-off insulators. "The stand-off that is better." Black or White. 10c each. 94c per doz.

GENERAL ELECTRIC 5 Henry, 1000 Milliampere Filter Chokes. In neat metal case. 5000 Volt insulation. 25 Ohms, 11 Lbs. Special, \$1.50 each. Four for \$4.95.

KELLOGG Hand Microphones. Sold in Feb. 1931 QST for \$6.50. Very sensitive. Designed for Ham Fone, public address and home recording. While They Last, \$2.65

Deposit required on all orders. No orders accepted under \$2.50.

Send for free Bargain Bulletin

Quick Service
HARRISON RADIO CO.
142 Liberty Street Dept. T-4 New York City

g2by g2ds g2vq g2yd g5ml g6hp g6vp g6wt gx2tm (Oct. 30, Nov. 1, 4, 8, 9) haf4d kaljm lulca lu4bb lu7ke lu8db lu8dy lu8en om1tb om2re on4au on4jb on4wk pkl pklci pklidf pkljr pk2aj pk2wj pk3bm pk3bq pk4aj pk4ja pk4yy py1ba py1dy py1fb py1ff py1ha py1xo py2aj py2as py2ba py2bq py2xa py2am py2an py2he st2d ve1dq vk6vi vq2ty vs2ad vs3ao vs6ae vs7ao vs7ap vs7gt vu2ah vu2df vu2jb vu2jp vu2kt w1bbq w1bdl w1bed w1cpm w1ra w1xp w2ya w2aqb w2le w2us w2vd w3blq w3blr w3kj w4awo w6dio w8bbl w8ben w8een w8eya w8pe w8su xg2b xg2c

W6AZC, E. E. Squier, 553 S. Tenth St., San Jose, Calif.

(3500-ke. band, 'phone and c.w.)

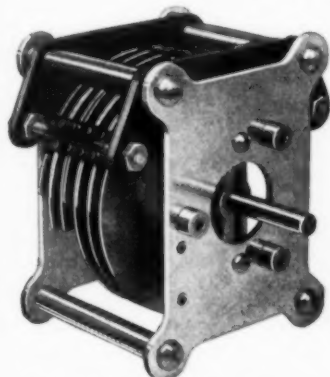
ve3lm ve4bf ve4bl ve4dq ve4fe ve4gd ve5ag ve5ai ve5bw ve5ef ve5er ve5fh vk2hr k4uf k6aja k6bas k6bbl k6vg k7agv al2ac al2ge al3ek al3ca w1abk w1arb w1ash w1bbj w1beq w1bes w1bjm w1bof w1cjd w1crj w1diz w1lid w1lkp w1mk w1mx w1ps w1ssa w2acm w2ag w2agk w2aiy w2ash w2akj w2au w2axs w2bhr w2cdo w2cenh w2cso w2cu w2cwk w2czz w2deu w2diu w2djk w2dll w2fo w2hmq w2kr w2wd w2ad j w3adm w3ajh w3akh w3amb w3aoo w3apt w3aqb w3arn w3avd w3bbd w3bfn w3bke w3bkn w3bag w3brv w3bra w3bse w3bvn w3bwc w3bwq w3ebn w3edg w3eht w3cio w3ek w3exm w3gl w3gy w3ht w3gah w3re w3vg w3zj w3zy w4aao w4acw w4ala w4aly w4aww w4bbf w4bbt w4gd w4hb w4hu w4kp w4kr w4nn w4qy w4sm w4tm w4ww w4xw w4sa w4shg w4shp w4ajo w4al w4apo w5aqe w5af w5ato w5auf w5aun w5avt w5awg w5awy w5bay w5bdt w5bes w5bft w5bgi w5bie w5bmi w5bri w5bse w5bst w5bts w5bxo w5bxm w5byp w5coy w5cdg w5ef w5ega w5fr wma w5pp w5vq w5yh w5zk w5zad w7aj w7abb w7abe w7abn w7abr w7aod w7ach w7acj w7acq w7adf w7aem w7afg w7afp w7afp w7afs w7age w7agq w7ahf w7ahl w7ahn w7ahn w7ahq w7ain w7ais w7aiu w7aiy w7aje w7akh w7akp w7akw w7alo w7ame w7ank w7ant w7aoi w7aol w7apd w7ape w7aqx w7aqz w7aro w7arv w7asl w7atv w7auh w7auj w7aus w7avn w7avo w7avv w7avs w7awh w7awi w7awj w7awl w7awv w7awa w7azi w7axt w7axy w7ayn w7ayo w7ayp w7ayq w7asb w7baa w7bau w7baw w7bba w7bbb w7bbe w7bbh w7bbp w7bbe w7bee w7beg w7bf w7bf w7bg w7bg w7bgn w7bgn w7bhp w7bia w7bie w7bio w7biw w7biy w7bjg w7bke w7bkg w7bkm w7blj w7blj w7bln w7blw w7bls w7bml w7bmw w7bmb w7bni w7boc w7bog w7bol w7bom w7bpo w7bpb w7bqm w7bqv w7bqv w7bah w7bux w7bux w7de w7ek w7en w7fp w7gt w7hq w7hr w7hs w7ia w7ii w7kg w7ko w7ld w7le w7mq w7ne w7nl w7nq w7nr w7og w7ov w7pe w7qf w7qp w7qu w7ru w7sa w7sk w7sq w7tk w7uq w7vn w7wf w7ady w7akf w7akv w7alq w7asq w7asy w7atf w7auf w7bae w7baa w7bds w7bfr w7bmg w7bny w7bpb w7bre w7bxy w7byf w7cce w7cdt w7cfs w7cio w7cpl w7cph w7csp w7cte w7cdh w7cdh w7cdk w7cdk w7cdi w7dsx w7dtn w7dve w7dyn w7ebe w7efo w7eon w7eqq w7eso w7flp w7flp w7fgq w7fgu w7fgx w7fip w7fik w7ms w7po w7st w7sy w7aab w7aai w7abk w7adl w7adk w7agg w7ago w7aiu w7aik w7akw w7ala w7amj w7ano w7aqc w7as w7as w7au w7au w7aus w7aye w7bbj w7bbj w7bbe w7bbe w7bhc w7bhn w7bie w7bih w7bbl w7bn w7bnt w7boa w7brr w7bub w7ubi w7bvl w7bvw w7bwc w7bwf w7bwh w7bxi w7bxo w7bxx w7cac w7cek w7edb w7edm w7eco w7efq w7efx w7egh w7ejj w7eon w7etl w7evt w7ewi w7ewv w7exx w7dex w7dgl w7dgs w7dhj w7di w7die w7dlk w7dmy w7dpo w7dsq w7daj w7den w7edl w7edx w7ehd w7ehz w7ejm w7ejq w7ekt w7emy w7eo w7epj w7eel w7euh w7evq w7evw w7exi w7eyc w7eyg w7eyl w7eyz w7faa w7fau w7fca w7fom w7fet w7fel w7fgo w7fig w7fhs w7fin w7fdi w7fpo w7fau w7fva w7fwo w7fxe w7gbe w7gbk w7gbq w7gfi w7gig w7gin w7gk w7gns w7gqb w7gqk w7gqk w7gqh w7grb w7gwn w7gxm w7hbg w7hgi w7hje w7hkn w7hl w7hmr w7hnm w7hws w7hva w7hxr w7hys w7hat w7ll w7lio w7liu w7jb w7pb w7vl w7vx w7y

W1CPH, T. L. Siglin, 16 Sylvan Ave., Edgewood, R. I.

(7000-ke. band)

ce2ai ce3ag cm2mg cm2bb cm2gu cm2wp cm2ad cm2w cm2ai cm2aa cm2op cm2mm cm2ug cm6op cm8az ct1as ct1as ci8e ear22 ear177 ear185 ear174 ear196 earva ear9 ear158 ear38 f8f fbt fm8er g2oq g5ov helig he2ea h8u h8k3g k4aop k4ph k4bf k4ry k4rk k4kd k4ac k4kc k5aa

WHY NOT OWN YOUR OWN DYNATRON FREQUENCY METER?



TYPE 556 Amateur-Band Condenser \$3.50

YOU can't afford to depend on borrowing a frequency meter to keep within the assigned amateur bands. Transmitters—even the best of them—change their frequency with temperature, vibration, minor adjustments, etc. With the radio inspectors making almost continuous checks on off-frequency operation, losing your license is much too great a risk to run for the mere saving of the few dollars you would spend for General Radio parts to build you a frequency meter.

The band-type condenser shown at the left is an essential element in a stable dynatron-frequency meter. Write us for descriptive literature and information on building your own instrument.

GENERAL RADIO COMPANY

Cambridge A, Massachusetts

PACIFIC COAST WAREHOUSE, 274 BRANNAN STREET, SAN FRANCISCO

Massachusetts Radio and Telegraph School

18 Boylston Street, Boston

Send for Catalogue

Tel. Hancock 8184

Established 1905

IMPROVED ALUMINUM BOXES

Precision-made; remove any side without affecting rigidity; brass corner posts; silver finish; cost no more than the ordinary box. Shipped KD.

1/16": 5x6x9, \$1.80; 10x7x6, \$2.95; 12x7x8, \$3.95; 14x7x9, \$4.65.
1/8": 5x6x9, \$3.85; 10x7x6, \$5.15; 12x7x8, \$6.35; 14x7x9, \$7.25.

Remit \$1.00 on C.O.D. orders. We invite your inquiries

JOHN R. SKRONDAL

80 Mt. Vernon St.

Ridgefield Park, N. J.

A NEW DEPENDABILITY IN SOUND EQUIPMENT



Improve your present
equipment with a
FOX Unit.

FOX ELECTRO-DYNAMIC UNITS are an outstanding marvel in construction and performance. With the use of Fox Units such disturbances as distortion under pressure, overheating unbalanced tone and back ground noises are eliminated.

These features are the result of years of research, which embodies every essential for positive, continuous and dependable performance under the most trying conditions.

FOX ALUMINUM TRUMPET HORNS have already established new records in sound quality; nothing has been developed as yet to equal the general satisfaction of Fox Trumpets. Exacting tests have proven a greater volume than any other trumpet type horn on the market.

Pole mounting of some kind is unavoidable in many sound projection applications at football stadiums, ball parks, fight arenas, airports, or outdoor reviews and conventions in general. Write for descriptive bulletins.

FOX AMPLIFYING COMPANY

Gen'l office — 625 Board of Trade Bldg. Factory — 388 Dorr Street

TOLEDO, OHIO, U. S. A.



Overall length of 6 feet with
32-inch bell

Say You Saw It in QST — It Identifies You and Helps QST

Cunningham

RADIO TUBES

RADIO'S MOTIVE POWER SINCE 1915



Where Tube Similarity] Ends

Outside appearances may be similar or even identical between various makes of radio tubes.

It is the accuracy with which the parts are precisely manufactured and tested that gives Cunningham Radio Tubes their remarkable outstanding quality and long life.

Quality safeguarded from within

E. T. CUNNINGHAM, INC.

(A subsidiary of Radio Corporation of America)

New York / Chicago / San Francisco
Dallas / Atlanta

k5ab k5ac lu2la lu5ar nylaa paon ti2fg helbj talce sulch
nede vo8wg xlaa xln xld xlm pylff vp2pa g5mi w6egh
w6evf w6am w6aoa w6eve w6ene w6cae w6dou w6acr
w6bxl w6fel w6apd w6exq w6ann w6bap w6ebg w6erm
w6anq w6euf w6bkw w6ell w6kh w6bop w6cm w6ckr
w6erc w6tc w6bc w6fde w6adk w6exx w7awg w7ayr w7bb
v6ldu v6ldw v6ldr v6bb v6zq v6fj v6tm v6ny v6kx
v6wm v6wk v6tm v6dd v6ij v6ur v6av v6im

Correspondence Department

(Continued from page 72)

Division of Time

213 So. 16th St., St. Joseph, Mo.

Editor, *QST*:

From listening to the high-power, high-class 'phone stations fighting the QRM and the number of unsatisfactory QSO's, it is evident that not only the low-power boys are suffering. Now we enjoy a unique and enviable position in the radio spectrum. We may use power up to one kilowatt, operate anywhere in the bands assigned to us any time of the day or night, have the choice of high or low frequencies for day or night work, and after we have once acquired a license about all that is required of us is that we keep a simple log of what we are doing — and some don't even do that.

But here's the big point. We have an organization of our own by which we may govern ourselves and it seems foolish if we do not take advantage of it. Some fellows even complain about the official observers reporting stations off frequency. Well, if you are a law-abiding ham and take the trouble to keep where you belong, do you think the rest of the gang should be made to suffer for the outlawry of a few? If we don't pull together we'll pull apart, and when we do — blooey! goes ham radio, believe it or not.

What does all this lead up to? Just this, we have the organization so why not use it for our own advantage? Here's the plan, provided the 'phone men can be induced to endorse it. Why not for two hours three nights a week declare an armistice in the QRM war and then set up time zones of ten minutes or fifteen minutes and allow only stations in the designated time zones to operate. Say we start on the east coast and allow only stations in the eastern time zone to operate during the first fifteen minutes of the hour. They could call CQ or test or whatever they wished; then when the time is up shut down and listen for stations calling them.

Any station outside this zone could call them during the next ten minutes or five minutes or whatever amount of time is thought best. Three minutes could be allowed for calling back and then, presuming contact to be established, thirty minutes for this zone to work. Then take the next zone west and do the same until we get to the west coast. This would give everybody a chance to QSO without so much QRM, would work no hardship on anybody, and the only requisite to make it work would be a good accurate time piece in every station.

— A. K. McLaren



5 METERS

(56 MEGACYCLES)



COMPLETE LINE OF EQUIPMENT

TRANSMITTERS — RECEIVERS — PARTS

now being designed — watch for announcements

CLASS "B" MODULATION TRANSFORMERS

For type 10 tubes as specified in Jim Lamb's article, December, 1931 QST. Built for the Ham. Net price \$8.30 per pair. Send money order. Immediate shipment.

AMATEUR BAND SPREAD RECEIVER

The REL Cat. No. 278 fulfills every requirement—Every district—Every continent. Easily copied when using only a short antenna. Ask your dealer for a demonstration.

Ask for REL Parts At Your Dealer's or Write Direct

RADIO ENGINEERING LABORATORIES, INC.

100 WILBUR AVENUE

LONG ISLAND CITY, N. Y.

Export Department: 116 Broad Street, New York City

Do you know that the latest Radio Amateur's Handbook is available in stiff buckram binding — \$2.00 per copy, postpaid?

When ordering a copy of this 9th edition, look at your present copy and determine if you want your next copy in more permanent form.

VT-203A's \$12.00

VT-211's and 845's, \$12.00. VT-211B's, \$8.00
VT-210's Heavy Duty 15 Watt, \$2.50. VT-866's, \$2.85

Complete satisfaction or your money refunded

VACUUM TUBE EXCHANGE

RIDGEFIELD, NEW JERSEY

Western Representative

M. C. JAMES, 252A Loma Ave., LONG BEACH, CALIF.

UNIVERSAL MODEL "KK"

A Top-Notch Broadcast Microphone

Model "KK" performance gives concrete evidence of Universal's unexcelled values in broadcast microphones.

List Price
\$50.00



Super-careful workmanship, up-to-the-minute design and the finest materials available have built its popularity. 24 kt. Pure Gold Spot centers. Alloy diaphragm, extra thin, under tension. Frequency range 50 to well over 6000 cycles. Entire microphone finished in 24 kt. polished gold.

Other Models from \$5.00 up

UNIVERSAL MICROPHONE CO., Ltd.

424 Warren Lane
Inglewood, Calif., U.S.A.



.. Includes Radio-phone, Television and Wireless Telegraphy

PORT ARTHUR COLLEGE

PORT ARTHUR (world-known port) TEXAS



U. S. GOVERNMENT ACCREDITED TRAINING SCHOOL

In three to seven months, we train you to pass government examination and secure your license. Examinations are held in our school about every 90 days. Our graduates are operating broadcasting stations in all parts of America, and many are travelling the seven seas as ship operators. If further details desired, mail coupon.

Port Arthur College, Port Arthur, Texas

Please send details concerning Radio Course to

Name

Street or Box

City and State

Say You Saw It in QST — It Identifies You and Helps QST

SUPER SPECIALS

COLUMBIA MONITOR. Accurately Calibrated. Completely shielded in aluminum case. Equipped with Vernier dial. Real band spread. Three coils supplied for 20, 40, and 80 meter bands. Complete with tube and batteries.

\$9.00



RCA licensed TUBES

Real good tubes, made to stand the gaff. Unconditionally Guaranteed for 90 days!

UX112A.....	55c	280M.....	2.49	238.....	90c
UX120.....	70c	UX226.....	45c	240.....	90c
UX171A.....	55c	UY227.....	45c	245.....	50c
UV199.....	65c	230.....	70c	247.....	85c
UX199.....	65c	231.....	70c	250.....	1.45
UX201A.....	45c	232.....	85c	531.....	85c
UX210.....	1.35	233.....	90c	280.....	50c
UX222.....	1.10	235.....	85c	281.....	1.25
UY224.....	60c	236.....	90c	860.....	2.95
		237.....	75c		

WESTERN ELECTRIC — 211E, 50 watt tubes. New. Guaranteed.....Special \$8.00

COLUMBIA POWER TRANSFORMERS

A quality line of transformers. All mounted, with leads brought out to lugs on terminal boards. Guaranteed for One Year!

Type	Wattage	Volts	Price
A	200	600-0-600, 7 1/2 ct. & 7 1/2	\$3.75
B	250	750-0-750	4.95
C	350	1000-0-1000	7.00
D	500	1500, 1000-0-1000, 1500	9.35
E	800	2000, 1500-0-1500, 2000	12.85
F	1200	750-0-750, 7 1/2 ct. & 7 1/2	5.75
G	400	750-0-750, 7 1/2 ct. & 7 1/2 ct	7.45
H	150	350-0-350, 5, 2 1/2 ct, 2 1/2 ct	3.75
K	100	285-0-285, 5, 5 ct, 2 1/2 ct	3.45
L*	250	350-0-350, 5 ct	4.45
M	150	400-0-400, 5, 2 1/2 ct, 2 1/2 ct	3.95
N	150	300-0-300, 5, 1 1/2 ct, 5 ct, 2 1/2 ct	3.75
R	750	2500, 1500-0-1500, 2500	14.35

* Type L is specially built for the 280M tube.

STAND-OFF INSULATORS, similar to General Radio. Each — 10c, Dozen — 85c.

COLUMBIA FILAMENT TRANSFORMERS. An efficient, sturdily constructed job. All secondaries center-tapped. Deduct 10% from these prices if no center tap is desired. **10,000 VOLT INSULATION!**

Volts	12 watts	25 watts	50 watts	100 watts
2 1/2	\$1.25	\$1.95	\$2.50	
2 1/2 & 2 1/2	1.50	2.25	2.75	\$3.75
7 1/2	1.25	1.95	3.25	4.45
7 1/2 & 7 1/2	2.25	3.95	4.95	
10		3.40	4.50	
5		3.25	4.00	

ELKON BONE DRY ELECTROLYTIC CONDENSERS, 500 peak voltage, 8 mfd. — 75c, 4 mfd. — 60c.

GENERAL ELECTRIC POWER TRANSFORMERS. 150 watts, supplies 750 volts, center-tapped, 5 volts, and 2 1/2 volts. Excellent for 245 transmitters.....\$2.35

GENERAL ELECTRIC 30 henry, 150 mill chokes. \$1.50
COLUMBIA 30 henry chokes. Very efficient, ruggedly built. Mounted. Special, 200 mills, \$2.40; 120 mills, \$1.30

Send for our new catalogue. It's free!

TERMS: Cash or C.O.D. No deposit required.

COLUMBIA SPECIALTY CO.

925 Westchester Avenue

New York, N. Y.

CANADIAN AMATEURS

Plate Transformers.....25 or 60 cy. up to 2 Kw.
Filament Transformers.....From a 245 to an 851
Rectifier Fil. Transformers.....280, 281, 866, PJ28, 872, etc.
Filter Chokes.....65 to 1500 Mills
Modulation Chokes.....200, 300, 500, 1000 Mills
Radio Frequency Chokes.....65, 150, 300, 500 MA, 20, 40, 80 Metres

Resistors — wire wound — 10, 20, 40, 80, 250, 500 Watt
EVERY ITEM DESIGNED AND BUILT TO HIGHEST STANDARD OF QUALITY

210 Class "B". Per Pair.....\$11.50
203A Class "B". Per Pair.....\$16.50

HAMMOND MANUFACTURING CO.

GUELPH, ONT., CANADA

Write today for Free Bulletin C35

Tough

Mona Beach Gun Club,
Mona Lake, Michigan

Editor, QST:

The other day I hooked up with W9——, and after chewing the fat a few minutes he asked for my full QRA. I told him Mona Lake, Muskegon, Mich., would reach me OK.

Now here is what started this tale of woe. W9—— leaps to the drastic conclusion that I am a YL op by the name of Mona Lake and ventures a few sweet nothings. Well, I could see right away that I should live at Paw Paw Lake so that I would be sure to be the OM. Now to-day I receive his card and on top in large letters is, "Hello Mona Dear" and at the bottom is, "Vy 73 es 88's". When any one asks for my full QRA now I have to add that I am not a YL and that Mona Lake is a lake just out of Muskegon and it's wet, and this extra bit kind of sets the fellows wondering.

Now what would you do? Imagine, "Hello Mona Dear, es 88's" to an OM!

—Harry Brill, W8QT

H.A.M.

216 Islington St., Toledo, Ohio

Editor, QST:

Just happened to notice the Stray on page 90 of the October, 1931, issue of QST in which G6WY claims to be the only amateur in the world with the initials H.A.M.

With the idea of showing that such a claim is very much unfounded, I started to figure about what chance there would be of a person's initials being H.A.M. I looked through the call book for a few pages and found that about 1 out of 10 had H for the first initial, 1 out of 27 had A for the middle initial, and 1 out of 14 had M for the last initial. Thus, out of 3800 people there should be one whose initials are H.A.M. Since there are about 70 stations listed on a page, it should only be necessary to look through 54 pages to find H.A.M. Actually I found W3UO to be the first one. He was listed on page 85 (1930 edition). Subtracting 18 pages on which names were not listed leaves 67 pages of names. Not bad when you consider that there were many H.-M.'s whose middle initials were not given.

—Harry G. Cotter, W8AXF

QSL

There are some things in this radio game

I can't quite figure out,
And one's this business of QSL's
And what it's all about.

Now if you work some local ham

A hundred miles away,
And beg of him to send a card

You'll get it the next day;
But if you work some real DX —

Along the coast or such —

If you ask him to QSL

What does he do? Not much!

—W9GWU

Send for
New 1932
Catalog

M. & H. SPORTING GOODS CO.

512 MARKET STREET

PHILADELPHIA

Specialists
in Radio
Equipment



GENERAL ELECTRIC RELAYS \$2

Type HG
WSF-323287

Dual contact — 12 volts,
.24 amperes — Enclosed
with dustproof cover and
mounted on bakelite base.
Coil easily removed for
rewinding. May be oper-
ated on 110 volts by con-
necting 400 ohm resistor
in series.

DUBILIER Mica Transmitting Condenser

1. mfd. MICA 1750-volts
working \$2.50
.1 mfd. 8500 volt \$1.25

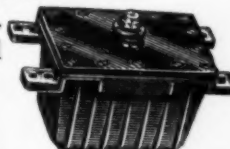


Dubilier Transmitting Condensers

Regular Price \$65

M. & H.
Special
Price

\$3



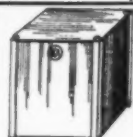
Type CD956 — .004 Mfd. — 12500 volts.
Mica dielectric — Mounted in aluminum
cases. Tested and guaranteed.



Heavy Duty Mica Plate

Blocking and By-Pass Condensers

Type No.	1883
D.C. Test Voltage	5000 Volts
CAP. MFD.	List Price
.0005	\$8.00
.0001	8.00
.0002	8.00
.00025	8.00
.0005	8.00
.001	8.00
.0015	8.00
.002	8.50
	YOUR COST
	\$4.70
	4.70
	4.70
	4.70
	4.70
	4.85
	4.85
	4.95



Electroalloy Cans

Electroalloy cans is a non-corrosive, non-magnetic material for radio panels, radio cans and radio shielding purposes. Drills and machines much easier than other metals. Finished in beautiful dull silver. Supplied in No. 16 thickness as follows:

No.	Size	Price	COST
1184	8x8x6	\$3.00	\$1.77
1185	6x6x6	2.75	1.63
1186	9x5x5	2.50	1.47
1187	5x5x6	2.25	1.33
1188	4x5x6	2.00	1.18
1189	10x8x6	3.50	2.05
1190	14x7x6	3.75	2.25
1191	12x10x6	4.75	2.80
1192	18x9x6	6.25	3.68
1193	12x6x6	2.75	1.63

CORNELL "CUB" CONDENSERS



Single mounting strap — can be attached to panel — Initial cost is less — most flexible and easiest mounting — no loss in efficiency — reduces costs by cutting assembly operations — high insulation resistance — extraordinary dielectric strength. Write for Circular.

CORNELL ELECTRIC MFG. CO.
Long Island City New York

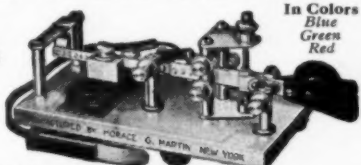
YOU CAN'T AFFORD TO BE WITHOUT THE NEW

Easy-Working Genuine Martin

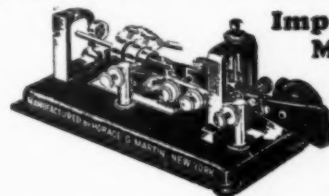
No. 6 VIBROPLEX

Reg. Trade Marks: Vibroplex, Bug, Lightning Bug

Makes sending
easy. Easy to
learn. Easy to
operate.



Black or Colored, \$17. Nickel Plated, \$19



Improved MARTIN Vibroplex

Black or
Colored, \$17
Nickel-
Plated, \$19

Special MARTIN RADIO Bug — Extra large Specially
Constructed Contact Points for direct use with-
out relay. Black or Colored. \$25

Liberal allowance on old Vibroplex
Remit by Money Order or Registered Mail

THE VIBROPLEX CO., Inc. 825 BROADWAY
Cable Address: "VIBROPLEX," New York

AMATEURS and EXPERIMENTERS!

Don't buy any radio parts
until you have seen the



Write for your copy today

American Sales Company

44 WEST 18th STREET NEW YORK CITY

The Oldest "HAM" Supply House

OM! Buy from us and SAVE!

WE OFFER YOU THE GREATEST BARGAINS
AT LOWER PRICES!

Jewell 5-10-15-25-50-100-150-200-300-500 milliammeters...\$5.15
Weston 5-10-25-50-100-150-200-300-500 milliammeters... 5.75
Standoff Insulators — 10c each... 1.00 doz.
Sangamo 5000 volts conds. .0001 .00025 .0005 .001 .002... 1.00
R.C.A. Hand Mikes with cord... 2.49
CeCo 866 Mercury Vapor Tubes — new — guaranteed 6 months 3.65
866 Mercury Vapor Tubes — new — CeCo make... 2.35
Pilot Sockets and all other Pilot products... 40 and 10% off
National — NEW SW3 and SW5 D.C. or A.C. Thrill Boxes Lowest
Prices!
REL Short Wave Sets... \$27.50
RCA — Brand New — UX-210... 3.95
RCA — Brand New — UX-250... 3.35
Condensers — guaranteed — 1 mfd. 750 D.C. working voltage —
card board cased... .65
Condensers — guaranteed — 1 mfd. 1000 D.C. working voltage —
card board cased... .75
Uncased Condensers, 1000 d.c. working voltages: 1 mfd. 49c, 1 1/4
mfd. 55c, 1 1/2 mfd. 59c, 2 mfd. 65c, 3 mfd. 79c
Metal cased condensers — national known make — 1 mfd. 600 d.c.
working voltage... .49
Flechthelm and Siemens & Halske Xmitting Condensers — NEW —
Special Prices
Utah d.c. dynamic speakers — 2500 ohms... 3.98
Centralab Volume Controls — new — 5000 ohms... .20
New Tung-sol 8 mfd. electrolytic condensers... .32
New Merahon electrolytic condensers — S-8 mfd. 44c, S-18 mfd. 59c,
D-8 mfd. 29c, T-8 mfd. 1.29, T-36 mfd. 1.98, Q-52 mfd. 2.98
Special 100 ft. no. 12 enameled solid copper aerial wire... .50
200 ft. no. 12 enameled solid copper aerial wire... .90
Automobile 6 tube receiver complete with tubes, suppressors,
batteries, dynamic speaker and cables — nothing else to buy. 39.50
R.C.A. Victor Hand Mikes — new — very special... 2.75
243 Tubes — Marathon — new — limited supply... .29
R.C.A. 48 Millihenry r.f. unmted. chokes... .25
Peerless 85 Millihenry r.f. unmted. chokes... .15
Amateur Call Books... .80
Aluminum and Electrolytic Panels and Boxes for all Amateur uses —
all sizes — Lowest prices in country!
Bakelite and Hard Rubber Panels — all sizes... Prices very low!
Plug-in Coil Forms — moulded bakelite... .33
Tin Jacks... .05 G.R. type Plugs... .06
Croley — 30 henry, double chokes — cased... .89
Croley — 30 henry, single chokes — cased... .59
BMS "Speed Bug" Adopted by U. S. Signal Corps... 8.98
Signal Keys, Relays, Sounders and Buzzers in stock — Special
Prices!
New! Universal Model X — two button Mike — special... 5.70
Plug-in Crystal Holders — dustproof — precision made... 2.25
Get our prices on guaranteed Crystals — best made — Lowest
Prices!
G.E. Neon Tubes: 1/2 watt .45, 1 watt .50, 2 watt .67
We stock a complete line of supplies for "Hams" and Servicemen
too numerous to mention. Direct Distributors for all nationally
known radio manufacturers.
20% deposit must accompany each order — balance C.O.D. Include
postage on all orders. All parts doubly guaranteed!
No order too small for us to ship. Shipments made to any part of the
World. Foreign orders solicited. Write for prices on any part you
need. Our prices are the Lowest!

(Say you saw it in QST)

Write for free "Ham" bulletin — full of Big Bargains. Swift Service

"If It's Radio — We Have It"

MAURICE SCHWARTZ & SON

710-712 Broadway

SCHENECTADY, N. Y.

COLLINS CRYSTAL TRANSMITTERS

are fast becoming the popular choice of both the old-timer
who has learned to appreciate the value of trouble-free,
efficient performance on all bands — and also the beginner
who wants to start right. Write at once for full details and
photographs. Units from \$33.95 up with carrier powers of
30 to 300 watts. Also a complete line of power supplies,
modulator and input equipment, relay racks, quartz crystals,
etc.

COLLINS RADIO TRANSMITTERS
CEDAR RAPIDS, IOWA

(Arthur A. Collins, W9CXX)

I. A. R. U. News

(Continued from page 45)

The organization of the N.R.R.L. comprises a Board, consisting of President, Vice President and two other members, with a paid Secretary. The Board is elected for a period of two years by the General Meeting, which is held during August each alternate year. Our next General Meeting is to be held in August, 1932. Headquarters also comprises a Sales Department under the supervision of the Vice President, a QSL Section, under the supervision of the Oslo Section Manager, and a Foreign Correspondence Department. The district organization provides for the formation of sections in places where the number of members is sufficient. These sections are under the leadership of a Section Manager, who is recognized by the Board as our representative in that part of the country. Sections at present exist in the following districts: Oslo, Vestfold with S.M. in Notodden, Oestfold with S.M. in Fredrikstad, Vestlandet with S.M. in Bergen, and Trondelag with S.M. in Trondheim. Other sections are in the course of formation. The internal organization of the sections is left completely to themselves, the only conditions being that all section members must be members of the N.R.R.L. as well, and that the S.M. must be recognized by the Board.

Our official organ at first was the "Norsk Radio," where a special page was placed at the disposal of the N.R.R.L. for club reports and news. After the General Meeting in 1930, however, we began editing a special mimeographed circular, which appears each month and our page in the "Norsk Radio" then was disposed of for a more popular review of amateur activities. When the "Norsk Radio" suspended publication early in 1931, our page was transferred to its successor, the "Radiobladet." However, our official organ is the circular mentioned above, called the "N.R.R.L. Bulletin."

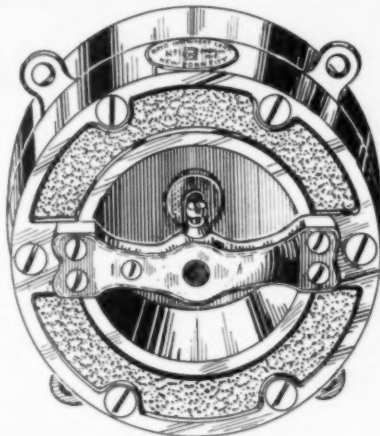
Preparations are well under way for getting the "Bulletins" into print, and as a matter of fact this matter is the one which is occupying Headquarters most seriously at present.

Legislation always has been very favorable towards the Norwegian high frequency enthusiasts. When the ban on transmitting was lifted, we were given the use of almost half the short-wave spectrum between 3 and 100 mc., with a power limited to the rather vague definition of "20 watts in the antenna" and the usual conditions regarding damped waves, avoidance of QRM, etc. Of course the frequency bands were drastically changed after Washington, the bands becoming the usual amateur ones with rather considerable safety margins on each side. The 3.5 and 1.75 mc. bands were not allowed except by a special permit, and then for one fixed frequency only, the reason being that these were not exclusive amateur bands. By the action of the N.R.R.L. the situation was soon improved regarding the 3.5 mc. band, for after obtaining permission to arrange tests in this band, and proving that it was very valuable for inland communication during

Now \$9.50 To NET Amateurs

The MAYO INSTRUMENT COMPANY offers to the amateur their new type "Q" double button all purpose Microphone, heretofore only offered to broadcasters, recording studios, etc.

This is truly an instrument you will be proud to own. It uses the new ground center, heat treated, duraluminum diaphragm which insures sensitivity, absence of hiss, and a frequency response equal to microphones listing up to \$75.00. This new and improved microphone is a precision instrument built to rigid specifications and is broadcast size, measuring $3\frac{1}{8}$ " diameter x 2" thick, 200 Ohms per button and finished in pure silver.



**New List Price
\$20.00**

GUARANTEE — We unconditionally guarantee all MAYO microphones for a period of one year and will repair or replace free of charge any microphone becoming defective through normal use in that time.

MAYO INSTRUMENT CORPORATION

1 Madison Avenue

New York, N. Y.

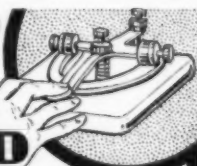
GULF RADIO SCHOOL

COURSES IN
RADIO OPERATING
AND
RADIO SERVICING

Second Port, U. S. A.

844 Howard Avenue NEW ORLEANS, LA.

**The HAND
That
Encircles
The WORLD**



YOU CAN MAKE BIG MONEY

There's romance and fortune in radio and telegraphy. Become an expert operator. LEARN IN YOUR OWN HOME — easily, quickly with TELEPLEX — the Master Teacher.

Entirely new code course in 12 rolls of tape. During last ten years, TELEPLEX has trained more operators than all other methods combined.

Write for folder Q-4

TELEPLEX CO.

76 Cortlandt St. New York

Teleplex



AMATEURS

West of
Rocky Mountains

We can supply all parts for
the new circuits

Send for your Catalog of
Nationally Advertised
Transmitting and Receiving Parts
at **LOWEST PRICES**

Amateurs' Headquarters of the West

RADIO SUPPLY CO.

H. A. Demarest, President

912-914 So. Broadway Los Angeles, California

(W6FBI located in Building)



— high speed RESPONSE

is an essential requirement in all experimental work — both in Sound and Television. This is assured by the use of

Telephoto Photoelectric Cells

(Caesium Argon Type)

Pamphlet on Request

TELEPHOTO & TELEVISION CORP.
133-135 WEST 19TH STREET • NEW YORK

CAN YOU?

If you can't do all this in the column to the right you should take THE CANDLER SYSTEM Course in High-Speed Telegraphing. It trains your Brain, Muscles and Nerves to CO-ORDINATE in doing fast, accurate work. It gives you CONFIDENCE, natural CONCENTRATION and banishes Nerve Strain. Original CANDLER METHODS have developed over 45,000 of world's fastest Morse and Radio operators including the champion.

TELEGRAPH-TOUCH-TYPEWRITING—only method for operators. Shows how to use "mill" in receiving, how to copy several words behind easily at high speed.

FREE Advice. If you want to become a real EXPERT Radio Operator, write Candler and receive the benefit of his 20 years' experience in developing EXPERTS. Your questions will be answered promptly and personally.

What Amateur and Commercial Radio Operators Can Do With the Help of the

CANDLER SYSTEM

They can make perfect copies of WNU press with pencil or "mill"; can cut mimeograph stencils directly from WNU, WHD and KUP press; can copy press 3 to 5 words behind easily without losing out; can count checks automatically and OK copy instantly; can send perfect code groups with key or bug at 30 to 35 wpm and more.

WALTER H. CANDLER
World's Only
Code Specialist,
Instructs
You Personally



Candler System Co., Dept. Q4
6343 South Kedzie Ave. Chicago, Illinois

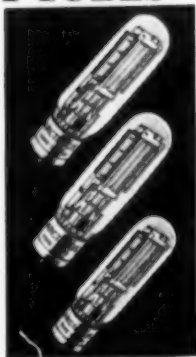
3 ARCTURUS 50-WATT TUBES

New, Rugged Design... Consistently Uniform

Arcturus announces these newest additions to its line of high-power tubes. New—not only in performance and stability—but in construction. Arcturus' famous "unitary structure" principle is incorporated.

These power tubes are interchangeable with corresponding type numbers, and their advantages are immediately applied to present apparatus.

Technical data bulletins on these three types, as well as Mercury Vapor Rectifiers E766 and E772, are available to interested parties on request. Arcturus Radio Tube Company, Newark, N. J.



Exclusive Arcturus Construction

Note the extreme rigidity of these tubes. The Unitary Structure principle of interlocking the elements maintains the precise interrelation of parts. The increased area of the plate provides generous heat dissipation.

ARCTURUS

Quality Tubes for Transmitting, Receiving and Industrial Uses

the winter, we obtained its unrestricted use. The 1.75 mc. band remains, in effect, closed for amateur use, the reason being that these frequencies are used extensively for short distance telephone communication in various parts of the country.

Regulations in other respects follow the usual European lines, the power being generally interpreted to mean 50 watts input to the last stage. The authorities are rather liberal as to matter transmitted by amateur stations, all messages relating to experiments and club activity being allowed as well as unimportant greetings, even to third parties.

Norwegian transmitters may be said to keep up a rather high standard. Crystal control is becoming popular, and as we have to meet with a lot of obsolete broadcast receivers, every step must be taken to avoid disturbances. This may also account for a fairly frequent use of back wave in keying, a practice which is of course not recommended, but as it is not forbidden and offers a very cheap means of avoiding click, it has its excuses. In our efforts to get this method into disuse we are greatly helped by the increasing use of crystal control, where this signalling method is useless.

The band by far the most popular is that at 7 mc., although we have a few DX hounds on 14 mc. and many stations working on 3.5 mc. So far there are only two WAC's in Norway; several others, however, are out for their sixth continent. Work on the higher frequency bands is still lacking, but this is a situation which better technical information supplied by a more comprehensive official organ might do much to improve.

Conditions for obtaining a transmitting license are rather stringent, but logical, and indeed the stringency in connection with certain points has at different times been stressed by the N.R.R.L. The applicants are required to pass an examination on theoretical subjects, demonstrate code ability at 12wpm., and show knowledge of national and international regulations. The license fee is fixed at kroners 30.— per annum, but a broadcast license at kroners 20.— being also required, the fee in effect becomes kroners 50.— or about \$9.25.

The direction in which the regulations in this country differ from most others is, however, in the manner of passing these license examinations. Applicants may pass all examinations before N.R.R.L. officials, and the mere statement that the N.R.R.L. is satisfied with the qualifications of the applicant is accepted by the telegraph officials. This unique position enjoyed by the N.R.R.L. of course speaks highly of the friendly spirit of our officials, but we dare say that this spirit is also a very sage one. For in this way the N.R.R.L. takes all the responsibility for its transmitter-members, and consequently it is of the very greatest necessity for us to eliminate unlicensed working, as well as to control the law-abiding tendencies of our membership. In the past, we have been successful in tracking down and stopping several unlicensed stations, and even

INC. RADIO SOCIETY OF GREAT BRITAIN

Overseas Subscription 12/6 per annum.

THE T. & R. BULLETIN

is published monthly
by Amateurs — con-
tains a wealth of
information of interest
to amateurs — gives
details of the many
contests organised by
the Society.

THE T. & R. BULLETIN

BRITISH EMPIRE
RADIO UNION

53, Victoria Street, London, S.W.1.



Super Akra-Ohm Resistors

Send for Bulletin 150-C describing the new Universal AC-DC Voltmeter and Milliammeter universal meter circuit. This booklet also contains valuable charts and wiring diagrams using Shallcross Resistors in multi-range meter circuits.

Send four cents in stamps and secure your copy today



ALUMINUM BOX SHIELDS



Genuine "ALCOA" stock, allverdlp finish. 5 x 9 x 6
\$1.80 — 9 x 14 x 7 \$4.65, 10 x 6 x 7 Monitor size
\$2.95. 5 x 5 x 5 Shield (like picture on the left) \$1.00

ANY SIZE TO ORDER

Genuine BRANDES Phones using handles instead
of headband. Made for R.C.A. \$1.95
Handles to fit all phones each45

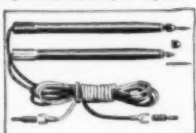
Hedgehog Transformers
Keying Relay for A.C. or D.C.
double pole. \$1.95
19 R.P.M. Motor, A.C. or D.C.
for remote control, etc. \$3.50
Scintum Cells \$3.50
Skinderviken Button 65c

C. R. L. IMPEDANCE COUPLED
IMAGE AUDIO AMPLIFIER for Short Wave
and Television. \$2.95

LARGEST VARIETY OF
RADIO PARTS IN THE WORLD

BLAN, The Radio Man, Inc. Box Q3
18 Cortlandt St. New York City

"BUDDY" Test Prods
Always sharp pointed, using pho-
nograph needles, 4-ft. wires, spade
or phone tips. Colored nipples
identify each lead. \$1.50 pair.



The WHEEL WITHIN the WHEEL...

INSIDE every radio business is AN-
OTHER business — A SERVICE
BUSINESS — the "Wheel Within
the Wheel."

And that SERVICE wheel is closer to
the hub, that supports all, than many
radio men realize.

Our observation shows that radio men
who conduct their Service Depart-
ments as a *business* which *should* show
a PROFIT, *never fail to make a profit
out of it.*

If you do service work, a SURE
way to make a PROFIT from it is
to use ELECTRAD high-quality
replacement parts. They save both
time and money.

Write Dept. Q-4 for money-making service helps

175 Varick St., New York, N.Y.
ELECTRAD

Say You Saw It in QST — It Identifies You and Helps QST

QST Oscillating Crystals

"Superior by Comparison"

New Price List Effective Immediately

New prices for grinding power crystals in the various frequency bands, said crystals ground to an accuracy of plus or minus .03% mounted:—

(Frequency range)	New list
100 to 1500 Kc.	\$40.00
1501 to 3000 Kc.	\$45.00
3001 to 4000 Kc.	\$50.00
4001 to 6000 Kc.	\$60.00

Above prices include holder of our Standard design. If crystal is wanted unmounted deduct \$5.00 from the above prices. Deliveries can be made within two days after receipt of order. In ordering please specify type tube, plate voltage and operating temperature. Special prices will be quoted in quantities of ten or more.

POWER CRYSTALS FOR AMATEUR USE

The prices below are for grinding a crystal to a frequency selected by us unmounted (if wanted mounted add \$5.00 to the price list) with a calibration accurate to BETTER than a tenth of one per cent. Immediate shipments can be made and all crystals guaranteed.

1715 to 2000 Kc. band	\$12.00 each
3500 to 4000 Kc. band	\$15.00 each

LOW FREQUENCY STANDARD CRYSTALS

We have stock available for crystals as low as 13 Kc. Prices upon receipt of specifications.

SCIENTIFIC RADIO SERVICE

124 Jackson Ave., University Park

HYATTSVILLE, MD.

"Crystal specialists since 1925"

Hi! Om if it's a Transmitting Product we have it

We always have the merchandise that we advertise in stock to insure immediate shipment. We can supply standard parts such as Amertran, Thordarson, Weston, Jewell, Cardwell, etc. at prices which only "Raysol" can offer, as we are buying merchandise in large quantities for export shipments.

HERE ARE SOME OF THE REAL RAYSOL VALUES

AMERTRAN PF 250 Pwr. Transformers 700-0-700, 2-7½V. winding, center tapped, 225 mls., tapped primary. Ideal for 210 transmitter. List \$25.00.	\$6.50
AMERTRAN No. 81 Pwr. Trans. 550V. 7½V. c.t. - 7½V. c.t., tapped primary 2½V. c.t.	3.95
TODD Pwr. Trans. 750-0-750, 2-7½V. c.t. and 2½V. c.t., 300 mls.	7.00
300-0-300 Trans. with 5V. winding, socket mounted on top of trans. for 280 tube.	1.00
AMERTRAN No. 151 P.P. Input and No. 443 P.P. Output Transformers, Listed at \$12.00 each.	4.50
ZENITH P.P. Output Transformers for 245s.	.75
Our filament transformers are made especially for 10,000V. insulation. All Center Tapped:	
2½V. — 10 amps. . . . \$2.00	7½V. — 6 amps. . . . \$2.50
10V. — 7 amps. . . . 3.00	15V. — 10 amps. . . . 3.50
ACME 250 mls. 20 Henry chokes	\$2.50
THORDARSON 85 mls. 30 Henry chokes for 245s75
TODD 200 mls. 30 Henry chokes	2.00
STROMBERG 2 Henry key click filter chokes	1.00
STROMBERG Double Chokes, 30 Henrys each.	1.00
AEROVOX 1000V. Condenser Block contains 2-2 mfd. cond. and 1-3 mfd. cond. at 1000V. working, in neat metal case	3.50
R.C.A. Tubes 50% off List Price	
Heavy Duty 50 Watt sockets, double contacts95
SPECIAL!	
AMERTRAN POWER PACK 600-0-600V., 5V. c. t. - 2½V. c. t. at 10 amps., - 2½V. at 1½ amps., - 2-20 Henry 150 mfd. Chokes	9.50

Raysol General Brokerage Company

110-A Chambers Street
Est. 1921

New York City
Radio Division Dep't R

Phone Barclay 7-8937

in getting certain of them condemned, and this it is our intention to continue. This policy, which is obviously radically different from that which certain other European societies must follow, may probably explain to some Union members our absolute refusal to support illicit Norwegian stations, forward cards, etc. We may in this



connection point out that the official list of calls is published in each issue of the "Call Book," and although additions may occur in the interval between issues, this will in any case give a quite good record of our licensed stations.

Our immediate expectations include the printing of our "Bulletin," as already mentioned; the erection of a Headquarters transmitter; the organization of an inland relay net encircling all the country; and the better cooperation between I.A.R.U. sections, especially in Europe. Regarding Madrid, we are keeping careful watch on the position of our own Government officials, we are hopeful as regards the rest, and we expect great things from our untiring Union Secretary, Mr. Warner.

The Economical Design of Smoothing Filters

(Continued from page 40)

L_k is the inductance per section after the first choke, and is taken as the average value if the various chokes are not identical.

n is the number of sections, counted for the groups after the first choke. Thus two chokes and two condensers in the usual arrangement are counted as one section, another choke and condenser added on are two sections, etc.

The results of various combinations are tabulated in Table V and plotted graphically in Figure 7. The various calculated values can all be obtained from the value of Z , as for single sections.

DISCUSSION OF TEST RESULTS, TABLE V AND CURVES OF FIG. 7

Table V shows the results of a large number of combinations of inductance and capacity in various numbers of sections. In each group the total inductance and capacity is held constant and its distribution varied. These combinations are

THIS TRADE MARK



on Transformers, Chokes, Rectified A. C. Power Units, Amplifiers, Voltage Regulators, and Photo Cell Devices — Amateur and Commercial —

IS YOUR ASSURANCE

of sound engineering, skilled production, fair prices, and a firm guarantee of satisfactory performance. SEND FOR LITERATURE.

DELTA MANUFACTURING CO.

CHOKES AND TRANSFORMERS



KEY OR VOICE TO ANTENNA

37 OSBORNE ST.

CAMBRIDGE, MASS.

F. S. DELLENBAUGH JR.
PRES. & CHIEF ENGR.

G. E. M. BERTRAM
TREAS. & GEN. MGR.

BOUND VOLUME XV of QST

WE have a limited number of copies of Bound Volume XV of *QST*. Vol. XV comprises the entire 1931 series of *QST*. This volume is made up of two books or sections, each containing six issues of *QST*. It is handsomely bound in red cloth and with gold imprint.

The complete volume is priced at \$5.00, postpaid.

QST

38 LaSalle Road
West Hartford, Connecticut

Send for Centralab's new Free Booklet "A Baptism of Fire"

Graphically describes the different and unique way in which Centralab Fixed Resistors are made. Handsomely illustrated . . . and incidentally CENTRALAB VOLUME CONTROLS for replacements have been radically reduced in price. Servicemen and amateurs everywhere are concentrating on CENTRALAB Volume Controls and Fixed Resistors.

Centralab

MAIL COUPON TO-DAY

CENTRAL RADIO LAB.
929E Keefe Avenue, Milwaukee, Wisconsin

Please send me your free booklet describing
your FIXED RESISTORS

Name

Address

City.....State.....

QST



A.R.R.L. FORMS FOR THE AMATEUR

THE AMERICAN RADIO RELAY LEAGUE

MEMBER'S CORRESPONDENCE

MEMBER'S CORRESPONDENCE STATIONERY

One color (black) heading now being used at greatly reduced cost to members.

Write your radio letters on League stationery — it identifies you.

Lithographed on 8 1/2 x 11 heavy bond paper.

100 sheets.....	50c
250 sheets.....	\$1.00
500 sheets.....	\$1.75

Postage Included

THE AMERICAN RADIO RELAY LEAGUE HEADQUARTERS WEST HARTFORD CONN. U. S. A. RADIOGRAM			
CITY OF ORIGIN HARTFORD CONN.	STATION OF DESTINATION WIMK 301	DATE MARCH 25	TIME 5/
TO CARL FRANK WIMK 14 NINTH STREET N W BIRMINGHAM ALA.		THIS MESSAGE WAS RECEIVED AT CARL FRANK WIMK BIRMINGHAM ALA.	
KINDLY ADVISE PRESENT STATUS OF THE ORIGINAL TRAFFIC ROUTE RUNNING FROM THE SAID COAST TO THE ORIENT STOP IN WIMK STILL A MEMBER OF THIS CHAIN QUOTE LATEST ROUTE MANAGERS BULLETIN DATED TODAY TO S. L. BARTY			
Rec'd TO STATION WIMK	FROM STATION HARTFORD, CONNECTICUT, U.S.A.	DATE 3/26/31	TIME 8:34 P.M.

OFFICIAL A.R.R.L. MESSAGE BLANKS

Most convenient form. Designed by the Communications Department of the A.R.R.L. Well printed on good bond paper. Size 8 1/2 x 7 1/4. Put up in pads of 100 sheets. One pad postpaid for 35c or three pads for \$1.00.

THE AMERICAN RADIO RELAY LEAGUE RADIOGRAM	
From: Re:	Date:
Time received: Address:	Date: At Radio Station. Phone:
THIS MESSAGE WAS TRANSMITTED FREE OF CHARGE BY AMERICAN RADIO RELAY LEAGUE. OTHERS WILL BE SENT FREE BY FILING AT THE STATION.	

MESSAGE DELIVERY CARDS

Neatest, simplest way to deliver a message to a near-by town. On U. S. stamped postals 2c each. On plain cards (for Canada, etc.) 1c each, postpaid.

AMERICAN RADIO RELAY LEAGUE WEST HARTFORD, CONN., U. S. A.

rather limited by physical facts at each end. If the unit condensers are cut down too small, resonance results, disturbing the circuit. If they are made too big the smoothing became so good that the resultant ripple is difficult to measure. Therefore the results must be interpreted with the conditions in mind that 25 to 50% errors are possible in measuring the ripple below 50 millivolts, and that the ripples are so low that background noises, such as induction, and harmonics introduced by the chokes themselves become important. In a case such as Group 4, line c, the ripple is much worse than calculated. The reason for this is that the approximate formula considers the condensers equally distributed, while here the two 1- μ f. condensers in the center materially reduce the effectiveness of that section. Again, in Group 6-c, the ripple is about twice as bad as in the previous line, since the 4- μ f. condenser in the third position of the latter increases the smoothing action of both the last two sections.

The results plotted in Fig. 7 are useful in choosing the number of sections that would be desirable. For total filter units of storage less than 4 watt-seconds, a single section filter is the best to use. Above that value two sections of the same total storage energy would give better results. For given voltage and current this means the same total inductance and capacity. Ultimately, when greater size of units is available so that they can be split up further without approaching resonance, three sections becomes the best. Then this condition is approached at about 9 watt-seconds total storage. Comparing the best number of sections by formula (n in Table V) with those by test as shown in Fig. 7, we find that the formula is useful if in general about one less section than it indicates as best is actually used. This is to be expected since the formula is approximate to start with, assumes no losses in the filter, and the first choke acts as a sort of extra half section which should be subtracted anyway.

Strays

OUR COVER THIS MONTH

Our cover this month will probably mean very little to the uninitiated. It is not a model of an iceberg posed with a trouser button. The two large objects on the left really are two fine quartz crystals from which, one of these days, a handful of quartz oscillators will be cut. The dark stick between them, casting a pointed shadow, is an uncut tourmaline crystal. At the point of the shadow is a cut and polished tourmaline oscillator — the sort of thing that Dr. Straubel writes about in this issue. We are indebted to the Premier Crystal Laboratories, Inc., of New York for the loan of the crystals illustrated.

Another chap wants to know how to send in Strays.

(1) A
nature
their pu
(2)
any ne
capital l
element
(3) T
paragra
(4) R
contract
(5) C
month
(6) A
which,
nature
can Ra
surplus
or appa
for spec
Relay L
paratus
commen
(1), (2),
regard

PLATE po
for quiete
pendabili
approches
B battery.
electrically
scribes com
wire, silico
transformer
units. Rec
Cleveland.

THE fines
most mode
Radiophon
complete li
cals, induc
sigs, built
quest. New
copy. Enso
Warren, O

BILLEY C
EXACT F
identifies u
inch squar
1715-20001
9000-73001
Standard R
equipped t
quency req
Biley Pies

LEARN W
largest, ene
Expenses l
Wood Stre

TRANSFC
ity, modern
voltages, c
Engineering
Indiana.

GOOD cry
cavern. He

SHORTW
Lize windi
pensators,
\$1.50 per i
St., Oklah

1000 watt
Mounted
Detroit, M

REINTZ
WIMK —
keying rel
transforme
audio tra
complete
changeable
Ionia.

CRYSTAL
crystals. P

QUARTZ
full details
Quartz su
Diamond I
10 to 15 b
tester with

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15¢ rate. Provisions of paragraph (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

PLATE power for your set, the very heart of its performance, for quietness, DX ability, lifelong permanence, absolute dependability, lowest ultimate cost, no other plate source even approaches the achievement of an Edison steel alkaline storage B battery. Built painstakingly; every joint pure nickel, upset electrically welded. Genuine Edison Electrolyte. Our list describes complete batteries, construction parts, enameled aerial wire, silicon steel. Available immediately, filament and plate transformers for the new 872-866 rectifiers, complete plate power units. Rectifier Engineering Service, 4837 Rockwood Road, Cleveland, Ohio.

THE finest in radio for amateur, broadcast and marine. The most modern short-wave receivers. Four to ten tube designs. Radiophones or transmitters of any power or type. We make a complete line of apparatus, including speech amplifiers, filter coils, inductances, power units, etc. Any special apparatus, designs, built to order, using your parts if desired. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Enall Radio Laboratory, 1527 Grandview St., S. E., Warren, Ohio.

BLILEY Crystals: It's wise to know who makes your crystals. EXACT Frequency (0.1%) and BLILEY engraved on each identifies us and guarantees you the finest quality. Power-type inch square supplied to approximate specified frequency: 1715-2000kc, \$5.50; 3500-4000kc, \$5.50; 4667-4800kc, \$7.50; 700-7300kc, \$10.00. Dust-proof plug-in holder, \$2.50. 100kc Standard Frequency Bar including mounting, \$14.00. We are equipped to manufacture crystals to your precision and frequency requirements: 20kc-8000kc. We can do it—write us! Bliley Piezo-Electric Co., Masonic Temple Bldg., Erie, Penna.

LEARN Wireless (Radio) and Morse telegraphy. School, oldest, largest, endorsed by telegraph, radio and government officials. Expenses low. Can earn part. Catalog free. Dodge's Institute, Wood Street, Valparaiso, Ind.

TRANSFORMERS and chokes made to your order. High quality, moderate prices, quick service. Write for quotations. Specify voltages, currents (or wattage) and frequency desired. Baker Engineering Laboratories, 2131 Curdes Ave., Ft. Wayne, Indiana.

GOOD crystals. Trade for meters, broadcast and amateur receivers. Herbert Hollister, Merriam, Kansas. W9DRD.

SHORTWAVE superhet. Intermediates 300 to 550-ke. Two lit windings, coupled for highest amplification, midget compensators, entirely shielded, leads brought out for easy assembly. \$1.50 per intermediate. E & H Radio Supply Co., 2924 W. 21st St., Oklahoma City, Okla.

1000 watt transformers, 1100-2200-4400 volt each side c.t. Mounted on marble. \$13.50. F. G. Dawson, 5740 Woodrow, Detroit, Mich.

HEINTZ & Kaufman 500 W transmitter—duplicate of W1MK—including plate transformer 3000 V and center tap—keying relay—General Electric time delay relay—filament transformer—antenna tuning unit—necessary controls—audio transformer—panel enclosed power supply, etc.—complete in every detail with 1700 kc coils—easily interchangeable. August Vollmer, Chief of Police, Berkeley, California.

CRYSTALS: See our advertisement on page 93 before ordering crystals. Premier Crystal Laboratories, Inc.

QUARTZ—make your own crystal oscillators. Write us for full details. Direct importers from Brazil of best quality pure Quartz suitable for cutting into Piezo electric crystals. The Diamond Drill Carbon Co., 720 World Building, New York City.

10 to 15 battery m.g. charger with switch panel and break down tester with 4 meters, \$425. cost. Will sell \$125. W1COX.

SELL or trade—204A, \$40, 204A, \$35, 211E, \$6. I.C.A. television outfit with Raytheon tube, \$25. 15 watt push-pull xmitter, \$12. Superhet converter, \$15. Scot short wave kit 10 coils, \$5. B eliminator, \$5. Samsen 16 PAM, \$35. W1COX.

STARTLING value! One of the best bargains we've ever run across. Duplex crystal ovens, only \$12.10 net. First time the amateur has had a chance to get a reasonably priced crystal oven. Hatry & Young, Hartford.

FEBRUARY, March and April Modern Radio's have articles by John L. Reinartz on \$2.85 oscilloscope and how to use it. 20¢ a copy. \$2 per year. Act now. All back copies up to February sold out. Modern Radio, Hartford.

COPPER coils. Write for prices and sizes. W2CHJ.

BRAND new DeForest 510 and five bucks cash for 203A. W9FLK, Sibley, Iowa.

WANTED: 1 or 2 KW spark transformer, 12,000 volt secondary. Also 872 rectifier. P. H. Craig, Westwood Bank Bldg., Cincinnati, Ohio.

POWER amplifier, Webster, 2 stage, 210 output, \$10. A. B. Clark, Albia, Iowa.

REWINDING—speakers, \$1.75 to \$2.50. Plate, filament, and electric set power transformers, reasonable price. A. B. Clark, Albia, Iowa.

QSL cards, message blanks, stationery, snappy service. Write for free samples to-day. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

HANDIEST extra duty guaranteed electric soldering iron. Especially designed for radio amateurs. Enthusiastically approved by hundreds of hams. Only 79¢ postpaid. Perryiron, Peru, Indiana.

TRADE or sell—power packs, 500 volts pure d.c. with two 281 tubes, \$10. L. D. Colvin, W7KG, Boise, Idaho.

BRAND new Sargent SW201 superheterodyne receiver for sale. Below cost! All letters answered. Leon McClurkin, Jacksonboro, Texas. W5DDO.

BEST offer takes d.c. superwasp with tubes. Good condition. Francis Churchill, 229 Charles Ave., Solvay, N. Y.

COMPLETE line amateur supplies. Apparatus bought. 212D \$25. Amateur Supply Co., 1614 St. Louis, Ft. Worth, Texas.

DEPRESSION prices, salvage equipment. Western Electric and Kellogg microphones 44¢. With polished stands \$1.02. Western Electric filter condensers 17¢. Two way house telephone kits, complete, instructions \$1.69. Resistance wire—audio oscillators—unusual equipment. Bargain bulletin, send stamp. Engineering Service Company, 1718 South 14th Street, Lincoln, Nebraska.

QSLs, 90¢ a 100, two colors. W9DGH, 1816 5th Ave., N., Minneapolis, Minn.

TRANSMITTERS, receivers or other equipment designed and built to specification. Can handle simple baseboard layout or fully mounted commercial type. Your parts used if desired. Engineering and construction guaranteed. Write for quotations. State your requirements in as much detail as possible. Holmes C. Miller, Radio Engineer, P. O. Box 105, Palo Alto, California.

QSLs, 85¢. Free samples. W8AKY, 2857 Ambler St., Cleveland, Ohio.

AERIAL with no insulation losses to appear in Modern Radio. March issue has 500 watt crystal controlled transmitter using only two 250 watt tubes. 20¢ a copy. \$2 per year. Modern Radio, Hartford.

WANT to buy W. E. 43A amp. for cash. Or will trade for W. E. transformers, 200V cond. potentiometers, shielded cable, 211E tubes, 250 watt rectifiers. Plugs and jacks, vol. ind. or sell separate. John Robbins, Box 288, Fairlawn, Ohio.

SELL new two UV860, one UX852, \$15 each. Guaranteed. W6RB, 7801 Weld, Oakland, Calif.

W8BAH says: 50 Watt sockets 95¢, RF Chokes 65¢, Pyrex. A.R.R.L. Handbooks, log books, QST Binders in stock. National and REL receivers, write for free dope sheet or send 25¢ complete set catalogues. W8BAH on 3750 kc., Harry Tummonds, Northern Ohio Laboratories, 2073 West 85, Cleveland, Ohio.

CRYSTALS: 80 or 160 meters, 3 kc. specified frequency, \$3.95. These crystals are of our standard quality differing from our higher priced stock in precision of calibration only. W6DCE, 2802 West Ave., 32, Los Angeles.

SELL—half kw. 500 cycle alternator, also Westinghouse 500 volt motor generator, both in new condition. Want: UV861 and 851 transmitting tubes. Craig, 701 First National, Salem, Oregon.

SELLING out: 500 watt transmitter. Five receivers. Everything. Write for details. W8BXV.

CRYSTALS: 1½ inch square x cut power type—guaranteed, \$3. Dustproof plug-in holders, accommodates 1½ inch crystals, \$1.75. W8DLM, Rochester, Mich.

WILL trade DeVry 32m. portable projector, value \$95 for one 851 or two 212Ds with filament transformer and one 203A. Write. W9APJ, Stuart, Nebr.

NO-battery flashlights should be in every ham's shack. Write for literature. W4AKS.

FOR sale: 849; 845; 203A; 852; a.c. super-wasp; 2000V power supply; 1000V power supply; many meters; complete 150 watt transmitter; auditorium amplifier and speaker. Crystals for new frequencies, exchanged, \$1. List for stamp. E. E. Hampshire, Elgin, Kans.

CECO 866 rectifier tubes \$2.95. Ceco 280M, \$1.98. 5000v. insulated 2½ volt 10 ampere filament transformer \$2.98. 2½ volt 8 ampere filament transformer for '27 or '24 tubes \$1.87. 7½ volt 3 ampere filament transformer \$1.98. Two 7½ volt 2 ampere winding filament transformer \$2.98. Hatry and Young, Hartford.

POWER crystals: Guaranteed. Highest quality quartz crystals scientifically ground for maximum power. X cut, one inch square carefully ground to your approximate specified frequency. 0.1% calibration. 1750 and 3500 kc. bands — \$5.50; 7000 kc. — \$8. Ground to within 0.1% of your specified frequency. 1750 and 3500 kc. — \$7; 7000 kc. — \$14. Plug-in, dustproof holder with jacks — \$2.75. Prompt shipment. Precision Piezo Service, 427 Asia St., Baton Rouge, La.

COPPER shield cans made to order at prices you can afford. Allen Strong, East Hampton, Conn.

NATIONAL SW3s \$29.45; REL278s \$26.60; Thermionic 866s \$2.85. Very lowest prices on National, REL, Sargent, Cardwell, Thorndarson, Jewell, Ward Leonard, Biley, Leach, Vibroplex, any others. Write. Henry's Radio Shop, Butler, Mo. QSLs, stationery, samples. W6DOU, 1562 B Street, Hayward, Calif.

HAMS look! 300 two color QSLs \$1.75. T. Vachovetz, Elmford, N. Y.

QSL cards, lowest prices, samples. W8DDS, Cleveland.

SELL PP.245 Xmitter, power supply, pentode audio receiver, tubes, wavemeter, all installed in small desk — \$50.00. A. C. Pilot superwasp, power supply, tubes, speaker — \$35.00. W2AAH — 21 Joval Court, Gerritsen Beach, Brooklyn, N. Y. 866s, \$3. 2 mfd 1000 volt filter 50¢. 866 filament transformers, \$3. All nationally advertised lines at standard trade discounts. Write for catalog. Richelieu Radio Company, Owen, Wisc.

SELL or trade Remington standard portable typewriter, \$20. Want Royal standard, W9ARE, Owen, Wisc.

FOR sale — crystal control transmitter, 30 watts cw, phone, photos furnished. Write Joe DuPre, Beachwood, N. J.

CRYSTALS — all frequencies, \$5. 0.1 of 1% calibration, re-grinding, \$2. Joe DuPre, Beachwood, N. J.

THERMOSTATS — for that new crystal fone job. Guaranteed \$3.50. W8EOB, 2641 Forest Grove, S. W., Grand Rapids, Mich.

SELL — new JRC tubes. Several each. UX210, \$2.95; UX250 \$2.85; mercury 280 \$1.25; mercury 281 \$2.95; UX866 \$2.95, transmitter tested. Odd fifties, meters, transformers, chokes, condensers, etc. List. W9DWA, Chicago.

SELL midget SW2 tube receiver, \$6.50. With coils. Postpaid. W9DKF, Peoria, Ill.

BIG specials for this month only. Transmitting tubes, brand new, guaranteed within RCA specifications. Type 211, \$7.25. 210, \$2. 866, \$2.25, 845, \$3.50, \$72, \$8.50. Pay when delivered plus postage. Silverman's, 66 South 9th St., Brooklyn, N. Y.

CARTOON QSLs. W8DWV, Ellwood City, Pa.

TRANSFORMERS — 200 Watt 1100-1500-2000 C. T. \$8.00. 400 watt 1500-2000-3000 C. T. \$10.00. 600 watt 2000-3000 C. T. \$12.25. 700 watt 2000-3000-4000 C. T. \$14.50. Polyphase, 25 cycle transformers. W9CES, Frank Greben, 1917 S. Peoria St., Chicago, Ill.

NEW fone band crystals, \$4. W9DZM.

COPPER coils and condensers. Write for price lists. W2CHJ. SELL General Radio wavemeter, type 558, complete, for \$10, or best offer. W1BSM.

CRYSTALS: A limited number 80 or 160 meters, \$1.25. Guaranteed excellent oscillators. W8CXP, Sandusky, Ohio.

CLASS B transformers, 210 set \$10. Give your equipment that commercial finish, crackle finish. Write. Radio Service Lab., 3135 Eden Ave., Cincinnati, Ohio.

CONVERTER, new short wave \$9.75 — "B" eliminator, humless on short wave sets \$1.90 — Two UV.712 R.C.A. audio transformers 95¢. Five new Edison batteries 85¢ each. — Tube cw note code practice set. — Omnigraph. — Fine new double button Mike. — Want set analyzer and good meters. Robert E. Snyder, Richmond, Indiana.

QSLs, twenty borders. Samples. W1DLD, Uxbridge, Mass.

SACRIFICE 210 push-pull transmitter with tubes and husky power supply, \$25. W8BRK.

NEW Aerovox electrolytic high voltage transmitting filter condensers, 1000 volts, 1500 volts, and up to 3500 volts, various capacities. Special low prices, exceptional values. Just what the amateur has been looking for. Write for information. Hatry & Young, Hartford.

EQUIPMENT bought, sold, exchanged. W9DZM.

KENNEDY Universal Receiver and Amplifier for sale. Best cash offer. Schreiber, 914 Orange, Wilmington, Del.

TRADE new UV845 and two 966s, for mercury or rectifier, high voltage transformer, 250 mill chokes. What say sum one? W9ARV, 2330 N. 72nd Court, Elmwood Park, Ill.

FRENCH tubes 30¢, 6-\$1.50. Western Electric 1000 volt condensers, 21AA, 1 mfd. 50¢. 21Y, ¼-40¢. 21AB, ¼-¼-40¢. Huhn, Woolley Ave., Long Branch, N. J.

SALE — Dayrad 330 oscillator with 50 output meter, best perfect condition, both \$30. 20% with order, balance cash with examination privilege. Clemuel Somers, Dresden, Tenn.

SELL — new Vibroplex, slide rule, Thompson's four mathematical books. W2CQG.

CARTOONS for QSL cards. "Gil," W1CJD, Guilderland, Conn.

SAMSON Amplifiers. Special Prices. New stock. Pam (PP210, two stage) \$12.95 each; Pam 16 (227PF210) \$19. each; Pam 9 (PP250, two stage) \$22.50 each; Pam 19 (PP225, three stage) \$27.50 each; Pam 24 and 59 using 224, 250 and 281 \$24.50 each; Pam 16, 45, or 51, \$17.50 each. Wright-DeCote model 107 a.c. \$14.50 each, slightly used. Model 217 a.c. brand new, \$29.50 each; Model 225, 2500 ohm field, \$10.95 each. Rotary Converters — Write us for prices. Wells-Smith Radio Corp., 26 N. Wells St., Chicago, Ill.

VIBROPLEXES, new: All models. Rebuilds, \$10. Guaranteed. Lydard, 28 Circuit, Roxbury, Mass.

CONDENSERS — Siemens & Halske, Morrill. Write for prices. W4AKS.

PILOT super wasp and tubes. Best offer takes it. W4AKS.

DOLLAR QSLs. W7WF.

SACRIFICE new National SW-3 with tubes. H. H. Freeman Roaring Springs, Tex.

FOR sale — 212 and 211 tubes — good condition. P. O. Box 43, Washington Square Station, Worcester, Mass.

RADIO parts — Electrad, Polymet, Pilot, Yaxley, Cardwell, National, Centralab, Frost, Tung-sol tubes, Jewell, Westinghouse, Readrite, Shallerco, I.R.C., Aerovox, A.R.R.L. logs-handbook, Amertran, Flechtheim, fuses, soldering irons, Kester solder, hookup and magnet wire. Discounts to amateurs and servicemen. Hatry and Young, Hartford.

QSL cards, message blanks, wall cards, stationery. Hillers Craneville, Pa.

SUPER wasp a.c. band spread, tubes, power pack, \$20. W6UC. Q-S-L-e?? Radiogram and shack cards. Finest samples! W8DEL Holland, Mich.

OMNIGRAPHS, Teleplexes, receivers, Vibroplexes, transformers, meters. Bought, sold, traded. Ryan Radio Co., Hannibal, Mo.

QSLs, two color, 100, 75¢; 150, \$1; 200, \$1.25. Samples free. W9GOF, D. Maxham, Mishawaka, Ind.

QSLs, send for prices and samples. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

HEAVY duty 866s, \$2.40. Postpaid. Send cash. Hudson Amateur Service, Piermont, N. Y.

NEW prices class B — pair — 210 — \$9.50, 203A — \$13.50. 1000V 866s \$3.25. 2.5V-10A. C.T. fil. transformer \$2.50. Brand new R.C.A. 250s \$2.25. Quarter kw SG tubes \$18.00 (used). Shielded single button mike transformers, exceptional quality \$1.50. .002, 5000V Sangoones 45. Most all ranges in Weston 301 milliammeters \$3.75 (some new, all new cond.) Brand new, first quality, latest model, genuine 203As \$12.00. Cash for transmitting equipment. List. E. Ewing, Jr., 29 S. LaSalle St., Chicago, Ill.

NEW GE211s, \$15; WE387 DB mikes, \$19; GE ares for as keep alive, \$9; MGs, dynamometers, Omnigraphs, receivers, meters, any transmitting tubes, other apparatus. List free. W9ARA, Butler, Mo.

FOR sale — transmitting equipment. Including crystals. Bur gains. W9AXH, 4130 North Meridian, Indianapolis, Ind.

SILVER Marshall 740 direct current set with all tubes, \$10. Knapp A eliminator, \$10. Want Kennedy Universal receiver. W. Nangle, 922 Ontario, Oak Park, Ill.

3000V, 2 ampere double commutator motorgenerator with filament generator \$750; 3000V, 1 ampere double commutator motorgenerator \$450; 1000V, ½ ampere motorgenerator \$60. C-Bias 1 ampere motorgenerator \$85. Motors, generators, converters, etc. Queen City Electric, 1734 Grand Avenue, Chicago.

QSL cards, two colors, \$1 per hundred. Free samples. W8DTI, 257 Parker Ave., Buffalo, N. Y.

QSLs, 90¢. SWLs, stationery, samples. W3BHG, 3536 Roland Ave., Baltimore.

PREPAID — Five meter super-regenerative honeycomb wound coil — 69¢; pie wound shortwave choke — 46¢; beehive inductors — 25 for \$2.61; Ceco 866 tubes, 6 month guarantee — \$3.71; 450 kc tunable bandpass screen grid intermediates — \$1.02; Purmetl aluminum solder — best obtainable — sample stick — 25¢. 100 pages amateur data — 25¢. Price sheets for stamp. No cod. Kladag Laboratories, Experimenters' Headquarters since 1920, Kent, Ohio.

SHORT-WAVE superheterodyne article by L. W. Hatry in Modern Radio for April. Year's subscription \$2.00, sample copy 20¢. Modern Radio, Hartford.

SELL — two 7½ watt transmitters, \$5. One monitor complete \$5. Two tube receiver, \$3. Complete with tubes. W9DLC, Spruce, Mo.

COMPACT 3 tube receivers, screen grid detector, completely shielded. Excellent band-spread. \$11.50 C.O.D. Edbern Radio Co., 1340 Merriam Ave., New York City.

WANTED: Transformers, transmitting tubes. Trade, sell: Crystals 3505, 3545, 3644, 3955. Guaranteed. \$5.00 W9ANY. 217 College Ave., Kansas City, Missouri.

with blueprints of your outfit. More satisfactory than cards. Samples. W2BJS.

You'll hear about Modern Radio everywhere. Magazine edited by R. S. Kruse, associate editor L. W. Hatry, carries articles by John Reinartz, Boyd Phelps, calculating charts by Ralph Hatcher. You're missing something. \$2 a year. Modern Radio, Hartford.

OPERATORS — commercial and amateur. \$1.00 brings you the latest issue of Radio Amateur Call Book, with press and weather schedules, high frequency commercials, fones, thousands of newly issued amateur calls from all countries. Issued Quarterly. Annual Subscription \$3.25. W9FO—Room 506, 610 S. Dearborn, Chicago, U. S. A.

SL cards, send 15 cents for samples. New ideas. Good printing. Exchange, P. O. Box 607, El Monte, Calif.

IDEAL plate supply operating from storage batteries and Delco plants. General Electric 24/1500 volt 233 ampere \$37.50 24/750 volt .2 ampere \$27.50 (on 12 volt supply delivers 375) Westinghouse 27½-350 \$7.50. With WE filter system, 0-50-500 voltmeter and switchboard \$15. Generators; 500 watt 500 cycle \$7.50. 900 cycle 200 watts \$20. Both with DC exciters, 6-15 volt 500 watts \$15. All ball bearing machines. Henry Kienzie, 301 East 84th Street, New York.

QSLs and stationery. W8AXD, Smethport, Pa.

Q R A SECTION

Mc, straight with copy in following address form only:

W6BRW — J. F. Smith, 1118 Emerson St., Palo Alto, Calif.

W7AEM — W7BTQ — Ralph L. Hardman, P. O. Box 34, Tigard, Oregon. (Portable)

W9CG — G. E. Gray, 3433 Walnut St., Chicago, Ill.

W7BNV — E. M. Lohrer, Box 54, Tanana, Alaska.

W1MK, A.R.R.L. Headquarters

R. B. Parmenter, Chief Op. "rp"

The following calls and personal sines belong to members of the A.R.R.L. Headquarters gang:

W1AKW-W1KP Clyde J. Houldson "ch."

W1BAW R. T. Beaudin "rb."

W1BDI F. E. Handy "fh."

W1CBD-W9ZZF Clinton B. DeSoto "dc."

W1AL J. J. Lamb "jim."

W1DF Geo. Grammer "hg."

W1EH K. B. Warner "ken."

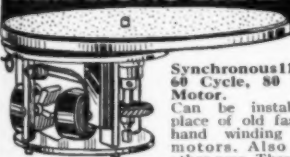
W1ES A. A. Hebert "ah."

W1FL G. Donald Meserve "dm."

W1SZ-W1BIZ C. C. Rodimon "rod."

W1UE E. L. Battey "ev."

G.E. PHONOGRAPH MOTOR



Synchronous 110 Volt,
60 Cycle, 80 r.p.m.
Motor.

Can be installed in
place of old fashioned
hand winding spring
motors. Also many
other uses. These G. E.

Electric motors are all brand new in original
factory cartons. Fully guaranteed. \$12.00 value
only \$3.95 including 12 in. turntable. Shipped Prepaid.
Manufacturers and dealers write for Special Quantity price.

Only
\$3.95
12 in.
VALUE

Power Generator

FOR SHORT WAVE
BROADCASTING

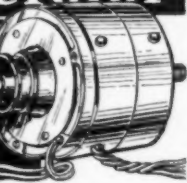
Reg. Price was \$75

U. S. Gov. power genera-
tor for radio transmitting
made by Westinghouse.
Ideal for Amateur Broad-
casting. Limited quantity
purchased from U. S.
Gov. Signal Corps. 250
to 550 cycles, 200 watts.
110 Volt, 4500 r.p.m.

Can be connected direct,
belt driven or wind propelled for Aeroplanes. Guaranteed new and
perfect. Worth \$75.00, but while they last, only \$4.95, plus shipping
charges. Send check or money order.

While They
Last!

\$4.95



NATIONAL JOBBING & EXPORT COMPANY
109 W. LAKE ST. Dept. 224 CHICAGO, ILL.



Oscillating Crystals

Precision ground, powerful oscillators

Unconditionally Guaranteed

80 and 160 meter bands, "X" or "Y"
cut — calibrated to 1/10th of 1% or
better and adjusted to within:

+ or - 5 Kc. of frequency specified \$7.50

1/2 of 1% of frequency specified. . . . 6.50

Random frequency (selected by us) 5.50

40 meter band adjusted to within
plus or minus 1% of specified
frequency. \$10.00

1-inch oscillating blanks. 3.75

Unfinished Blanks. 2.00

Dustproof Holders, with nickel-
silver electrodes. 2.50

175 Kc. Stenode Crystals. \$3.50

High or low frequency Crystals of all
descriptions made to order

All our Crystals are made from finest
quality Brazilian Quartz

We invite your inquiries
Write for any further information
desired

**PREMIER CRYSTAL
LABORATORIES, Inc.**

74 Cortlandt Street New York City

HANDBOOKS

EXCHANGED!

In exchange for your old handbook and the
small sum of Bucks 1 we will send you a
copy of the new supervaluable 9th edition of

The Radio Amateur's HANDBOOK

and let you keep the old copy yourself — so
you can see how vastly better the new one is.
Seize this remarkable opportunity to-day!

A.R.R.L.

38 LaSalle Rd.

West Hartford, Conn.

Rush Ninth Edition Handbook!

(Name)

(Street or Box)

(City and State)

To Our Readers who are not A.R.R.L. members

WOULDN'T you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of *QST* you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have the membership edition of *QST* delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

A bona fide interest in amateur radio is the only essential qualification for membership

AMERICAN RADIO RELAY LEAGUE
West Hartford, Conn., U. S. A.

I hereby apply for membership in the American Radio Relay League, and enclose \$2.50 (\$3 in foreign countries) in payment of one year's dues, \$1.25 of which is for a subscription to *QST* for the same period. Please begin my subscription with the issue. Mail my Certificate of Membership and send *QST* to the following name and address.

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of *QST*?

Thanks

For Your Convenience

QST'S INDEX OF ADVERTISERS IN THIS ISSUE

Allen-Bradley Company	89
American Sales Company	83
Areturus Radio Tube Co.	84
A. R. R. L. Apparatus	90
A. R. R. L. Handbook	Cor. IV, 91
A. R. R. L. Log Book	Cor. II
Blan, The Radio Man, Inc.	87
Candler System Company	88
Cardwell Mfg. Corp., Allen D.	2
Central Radio Labs.	80
Collins, Arthur A.	84
Columbia Specialty Co.	82
Cornell Elec. Mfg. Co.	83
Cunningham, Inc., E. T.	80
DeForest Radio Company	1
Delta Mfg. Company	89
Electrad, Inc.	87
Fox Amplifying Company	79
General Radio Company	79
Gross Radio Company	87
Gulf Radio School	84
Hammarlund Mfg. Company	96
Hammond Mfg. Company	82
Harrison Radio Company	78
Inc. Radio Society of Great Britain	87
Jewell Electrical Instrument Co.	73
Jewell Radio Company	76
Leeds Radio Company	6, 7, 95
Littelfuse Laboratories	77
Massachusetts Radio & Telegraph School	79
M & H Sporting Goods Company	83
Mayo Instrument Corp.	85
National Carbon Co.	77
National Company	74
National Jobbing & Export Co.	93
Odeon Mfg. Company	77
Port Arthur College	81
Premier Crystal Labs.	93
QST Back Copies	73
QST Binder	Cor. III
QST Bound Volume	89
Radio Engineering Labs.	81
Radio Supply Co.	85
Raycol General Brokerage Co.	89
RCA Institutes, Inc.	68
Sangamo Electric Co.	77
Schwartz & Son, Maurice	84
Scientific Radio Service	88
Shallcross Mfg. Company	87
Skrondal, John R.	79
Sparks-Withington Co.	4
Telephoto & Television Corp.	85
Teleplex Company	85
Thordarson Electric Mfg. Co.	70
Uncle Dave's Radio Shack	73
United Radiobuilders	71
Universal Microphone Co.	81
Vacuum Tube Exchange	81
Vibroplex Company	83

MIM!

The Biggest Sensation in Tube History

NABBED BY LEEDS RADIO CO.

de Forest

TRANSMITTING TUBES

Brand New—Firsts—

Carrying DeForest factory guarantee

Audion 503-A — The standard amateur 50 watt — stable oscillator and r.f. power amplifier. Net Price \$25.

Audion 511 — General purpose medium power tube. Ideal as oscillator, modulator, r.f. or a.f. power amplifier. Net Price \$25.

Audion 545 — Essentially an a.f. amplifier, particularly as an output tube in audio system or as modulator. Net Price \$30.

*Any One of these
three Tubes*

\$15⁰⁰
Each

OUR PRICE

\$3⁹⁵
Our
Price

No. 566 — Half-Wave Mercury vapor rectifier, of special hot cathode construction, emitting a wave form easy to filter. Net Price \$6.35.

*Why go into details how we obtained this buy.
The prices speak for themselves. We have
enough of each number to last through April.
Better get them NOW.*

See Our Special April Bargains on Pages 6 and 7.

MAIL ORDERS FILLED SAME DAY

10% Cash
Must Accompany All
C. O. D. Orders

45 Vesey Street, New York City
New York Headquarters for Transmitting Apparatus
WHEN IN TOWN VISIT OUR STORE

LEEDS
The Home of RADIO

Say You Saw It in QST — It Identifies You and Helps QST

The COMET "PRO"



Handsome walnut ventilated cabinet, with "businesslike" control panel

The Hammarlund-Engineered High-Frequency Receiver for Professional Operators



A clean-cut, accessible chassis

An eight-tube custom-built super-heterodyne, which will do all that the professional operator demands between 14 and 200 meters.

Efficient band-spread tuning system, with special long-wave oscillator for sharp, clean C.W. reception; also simplifies tuning.

Quiet 227 tube output, with phone jack and speaker connections. Connection also for external amplifier.

Super-sensitive; super-selective.

Write for details

HAMMARLUND Precision PARTS for Short-Wave Construction



ISOLANTITE Short-Wave COIL FORMS. Lowest losses. Maximum sensitivity and selectivity. Non-slipping surface. No drilling. Flat-top handle for marking wave-lengths. Winding surface, $2\frac{1}{2}$ " long by $1\frac{1}{2}$ " diameter. Four, five and six prongs to fit standard sockets or the new Hammarlund Isolantite Sockets.



Short-Wave TUNING CONDENSER. High capacity; wide range. Soldered brass plates, rugged frame. Double four-point wiping contact. Isolantite insulation. Single and dual models; 20 to 325 mmf. per section.



ISOLANTITE SOCKETS. Electrical efficiency not affected by temperature or humidity. Top and sides glazed. Perfect contact by reinforced side-gripping rust-proof springs. Four, five and six prongs, with standard mounting centers.

Mail the
Coupon

For Better Radio
Hammarlund
PRECISION
PRODUCTS

HAMMARLUND MANUFACTURING CO.,
424-438 West 33rd St., New York
Please send details of — New Comet "Pro" Receiver, — Sockets, — Wave Coil Forms, Condensers, and Sockets.

Name

Address